



**TRANSPORTATION SAFETY BOARD OF CANADA
ANNUAL REPORT TO PARLIAMENT 2023–2024**

Canada 

Transportation Safety Board of Canada
Place du Centre, 4th floor
200 Promenade du Portage
Gatineau QC K1A 1K8
819-994-3741; 1-800-387-3557
tsb.gc.ca
communications@tsb.gc.ca

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the Transportation Safety Board of Canada, 2024

Annual Report to Parliament 2023–24

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Bureau de la sécurité
des transports
du Canada

Transportation
Safety Board
of Canada

Place du Centre, 4th floor
200 Promenade du Portage
Gatineau QC K1A 1K8

06 June 2024

The Honourable Harjit S. Sajjan, P.C., M.P.
President of the King's Privy Council for Canada
House of Commons
Ottawa ON K1A 0A3

Dear Minister,

In accordance with subsection 13(3) of the *Canadian Transportation Accident Investigation and Safety Board Act*, the Board is pleased to submit, through you, its Annual Report to Parliament for the period 1 April 2023 to 31 March 2024.

Yours sincerely,

Original signed by

Kathleen Fox

Chair

Canada 

Message from the Chair

The 2023–24 fiscal year marked another productive one for the Transportation Safety Board of Canada (TSB) with the release of **43** investigation reports, **eight** safety recommendations, **three** safety concerns, and **seven** safety advisories on changes needed in the air, marine, and rail sectors. Additionally, the TSB assessed the responses to **60** previous recommendations according to the extent to which the underlying safety deficiency in each recommendation has been or is being addressed. During this review cycle, responses to **three** recommendations were assessed as Fully Satisfactory, our highest rating.

Budget 2023 provided the TSB a much-welcomed funding injection to address critical operating requirements that sustain our investigative capacity and operations into future years.

In June 2023, the TSB launched a complex investigation into the marine occurrence involving the Canadian-flagged vessel *Polar Prince* and the *Titan*, a privately operated submersible that imploded during its descent to the wreckage of the *Titanic*. We continue to investigate this highly publicized occurrence and cooperate with the United States (U.S.), United Kingdom, and France, under the International Maritime Organization’s Casualty Investigation Code.

In November, we released our report into the 2021 fatal sinking of the fishing vessel *Tyhawk* and issued **two** recommendations urging Transport Canada to refine the definition of major modifications to a vessel, and to require modifications be assessed by a competent person. A **third** recommendation to Fisheries and Oceans Canada asked that safety of fish harvesters be considered in all fisheries resource management decisions.

In December, we released our report into the 2019 train derailment that occurred in the Canadian National Railway Company Paul M. Tellier Tunnel crossing the Canada–U.S. border. The TSB issued **four** safety advisory letters addressed to Transport Canada and the U.S. Federal Railroad Administration advising them of unsafe conditions and prompting measures and actions to reduce risks and address safety deficiencies.

In mid-February 2024, we released our report into the 2021 fatal helicopter crash on Griffith Island, Nunavut. This investigation resulted in **four** recommendations to the regulator calling for the implementation of safety measures to mitigate the risks that persist in helicopter reduced visibility operations.

In March, we released our investigation report into the 2021 train collision and derailment near Prescott, Ontario, which raised a safety concern on the lack of prohibitions regarding the consumption of alcohol by railway employees in safety-critical positions. Currently, rail employees are expected to self-assess and determine if the effects of alcohol have sufficiently diminished to be fit for duty. The Board is concerned that such employees could perform their duties while under the influence of alcohol, which could have significant adverse outcomes that affect the safety of crews, passengers, and the environment.



This fiscal year has seen some changes to the Board—we welcomed a new part-time member, Dr. Leo Donati, a former TSB executive who brings significant expertise in technical matters, human factors, and multi-modal accident investigations to the Board. We were also pleased regarding the re-appointment of Board Member Ken Potter in December 2023, who has served on the Board since 2019.

I have announced my retirement effective in late August at the end of my term as Chair. It has been an honour to serve on the Board since 2007, and as the Chair of the TSB for the last 10 years. I am proud of the progress that has been made in addressing many of the TSB's outstanding recommendations. I continue to be inspired by the dedication and professionalism of our staff: their commitment to excellence has made the TSB a world-class safety investigation organization. Regardless of who serves on the Board in the future, the mandate and focus of the TSB's work to advance transportation safety will continue unabated, supported by the expertise and dedication of both our staff and the Board.

Kathleen Fox
Chair

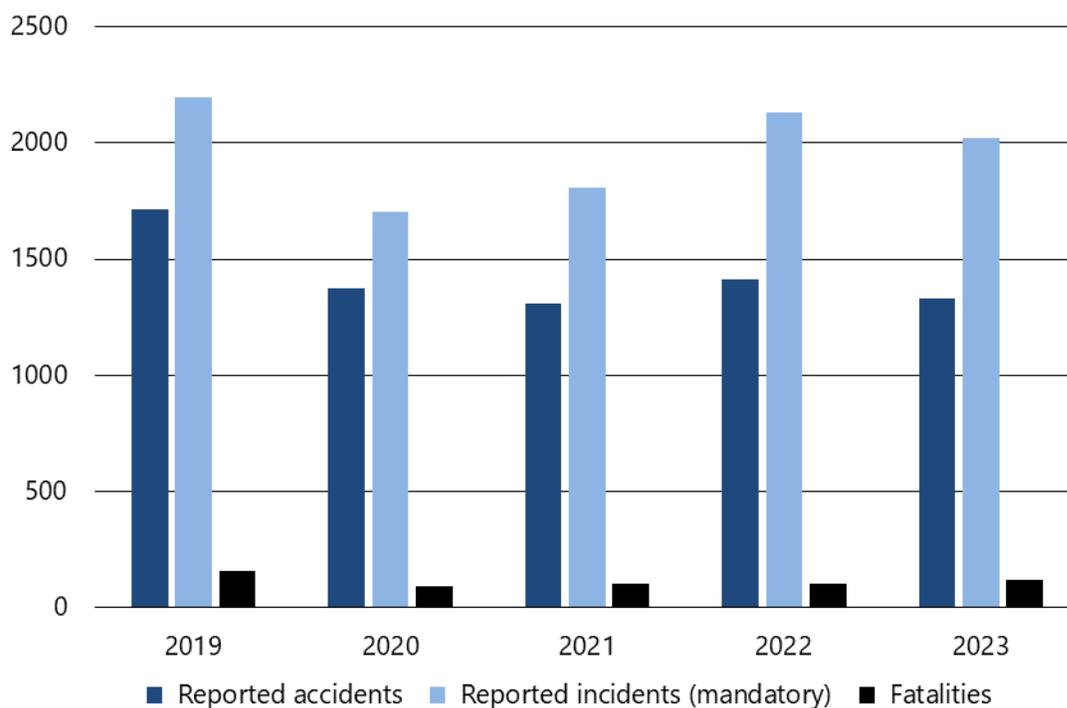
The year in results

In 2023-24, the Transportation Safety Board of Canada (TSB) assessed and classified thousands of accidents and incidents that occurred across Canada in the air, marine, pipeline, and rail transportation sectors (see the definitions in the [Policy on Occurrence Classification](#)).

TSB investigators deployed to selected occurrence sites to collect data in an effort to identify what happened and why, and to highlight known and emerging safety issues—all in keeping with our mandate to improve transportation safety in Canada.

The total number of occurrences [reported to the TSB](#) (as required under the *Transportation Safety Board Regulations*) in the 2023 calendar year (3350) was 6% lower than the 3556 occurrences reported in 2022 (Figure 1).

Figure 1. Transportation occurrences reported to the TSB, 2019 to 2023



Of the 3350 total occurrences reported in 2023, 1331 were accidents, which represents a 6% reduction from the 2022 total of 1419 and is 13% below the 10-year average of 1535.

However, despite the lower number of reported occurrences, there was an 11% increase in fatalities (118) across all transportation sectors than in 2022 (106). The 2023 total represents a 4% decrease in fatalities from the 10-year average of 123.

There was a total of 2019 incidents reported to the TSB in 2023 representing a 5% decrease from the 2022 total of 2137 and 1% more than the 10-year average of 1996.



The TSB at work

Deployments

TSB investigators deployed 72 times during 2023–24 (up from 69 the previous year) in response to occurrences in the air, marine, and rail sectors. These deployments took staff from the TSB regional offices and head office to locations across the country, the U.S., and internationally.

Investigations

In 2023–24, the TSB began 65 new investigations and completed 43, across all four transportation sectors ([air](#), [marine](#), [pipeline](#), and [rail](#)), that ranged from in-depth and complex to limited scope (Table 1).

Table 1. TSB investigations, 2022–23 and 2023–24

Investigations	2022–23	2023–24
Started during year	50	65
Completed during year	59	43
In progress on 31 March	65	87

Average completion times increased, both overall and for the various classes of investigations. A significant portion (48%) of the total number of investigations completed during the reporting year were classified as Class 4 investigations (limited-scope investigations for which the TSB gathers facts, conducts limited analysis, and reports on occurrences to raise awareness of possible safety issues).

In support of TSB investigations, engineers, technical specialists, and human factors specialists began 179 projects of which 141 were laboratory reports and 38 were human factors reports. They also began seven projects and completed nine technical reports for foreign investigation agencies.

Safety communications products

Each year, the Board reassesses outstanding recommendations as part of ongoing efforts to urge stakeholders to act on the safety issues that TSB investigations have identified. In 2023–24, the Board reassessed and closed three outstanding recommendations as Fully Satisfactory: one in air transportation safety ([A21-01](#)), one in marine transportation safety ([M99-02](#)), and one in rail transportation safety ([R22-01](#)). The Board also reassessed and closed one outstanding recommendation in air transportation safety as Satisfactory in Part ([A07-06](#)).

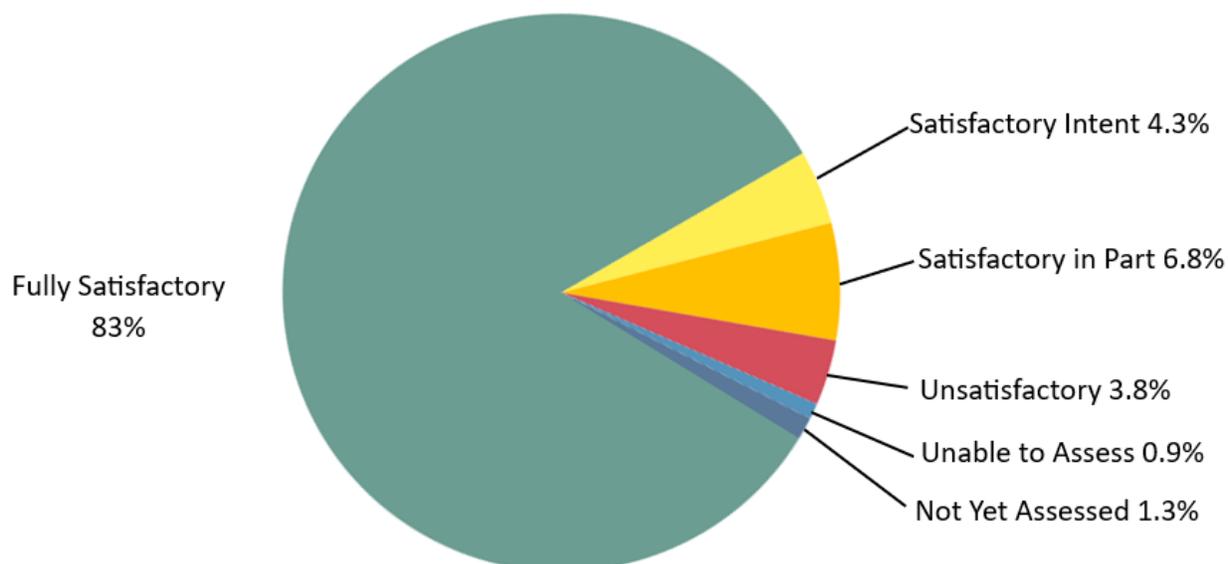
Table 2. Safety communications products issued, 2023–24

Safety advisories	Safety information letters	Safety concerns	Recommendations
7	3	3	8



Since 1990, the Board has made 634 recommendations. By the end of 2023–24, it had given 83% of the responses to these recommendations the [highest rating of Fully Satisfactory](#). This means that stakeholders, including Transport Canada, have taken action to substantially reduce or eliminate the safety deficiencies the Board has identified (Figure 2).

Figure 2. Board assessments of responses to recommendations from 29 March 1990 to 31 March 2024



At March 31, 2024, there were 91 outstanding recommendations, fewer than half of which date from 10 years ago or more (Table 3).

Table 3. Age of outstanding recommendations at March 31, 2024

Age of recommendations	Air transportation safety	Marine transportation safety	Rail transportation safety	Total (%)
Less than 1 year	4	4	0	8 (8.79%)
1 year to less than 7 years	14	12	6	32 (35.16%)
7 years to less than 10 years	8	4	5	17 (18.68%)
Sub-total	26	20	11	57 (62.64%)
10 years to less than 15 years	5	2	1	8 (8.79%)
15 years to less than 20 years	10	3	0	13 (14.29%)
20 years or more	8	2	3	13 (14.29%)
Sub-total	23	7	4	34 (37.36%)
Total	49	27	15	91 (100.00%)

SECURITAS

Through the TSB’s SECURITAS program, transportation industry employees and the public can report, in confidence, unsafe actions and conditions they observe.

The TSB received 271 SECURITAS reports in 2023–24 (Table 4). This number is higher than the 188 reports received the previous year.

Table 4. SECURITAS reports received and closed in 2023–24

	Air transportation safety	Marine transportation safety	Pipeline transportation safety	Rail transportation safety
Reports received	139	55	0	77
Reports closed	139	54	0	76

The TSB received 139 SECURITAS reports concerning air transportation safety. A considerable portion of these reports concerned low-flying aircraft, aircraft maintenance, and unfit pilots.

The TSB received 55 SECURITAS reports concerning marine transportation safety, an increase from the previous year (29). These reports covered a wide range of unsafe conditions on commercial fishing, passenger, and cargo vessels.

The TSB also received 77 SECURITAS reports concerning rail transportation safety. These included reports about the storage of unsecured items in overhead storage compartments on passenger trains, personnel working with all terrain vehicles within point protection zones, and pedestrian assistive devices becoming immobilized at railway crossings.

Communications and outreach

Regular communications and outreach are important aspects of the TSB’s efforts to advance transportation safety. Through its website, social media channels, and participation at in-person and virtual events, the TSB reaches industry and government stakeholders as well as media and members of the public across Canada and around the world (tables 5, 6, and 7).

Table 5. TSB media and stakeholder outreach activities, 2023–24

Media requests	Interviews	News conferences	Industry outreach events
409	40	2	69

Table 6. TSB communications products, 2023–24

Deployment notices	Investigation webpages	Media advisories	News releases	Investigation reports
49	47	4	48	43



Table 7. TSB social media presence, 2023–24

YouTube followers	Flickr followers	X (Twitter) followers	LinkedIn followers	Facebook followers
5714	609	26,617	7149	1352

Outreach activities

The TSB took part in over 50 industry events and meetings during the year to discuss matters in transportation safety. These events included the following:

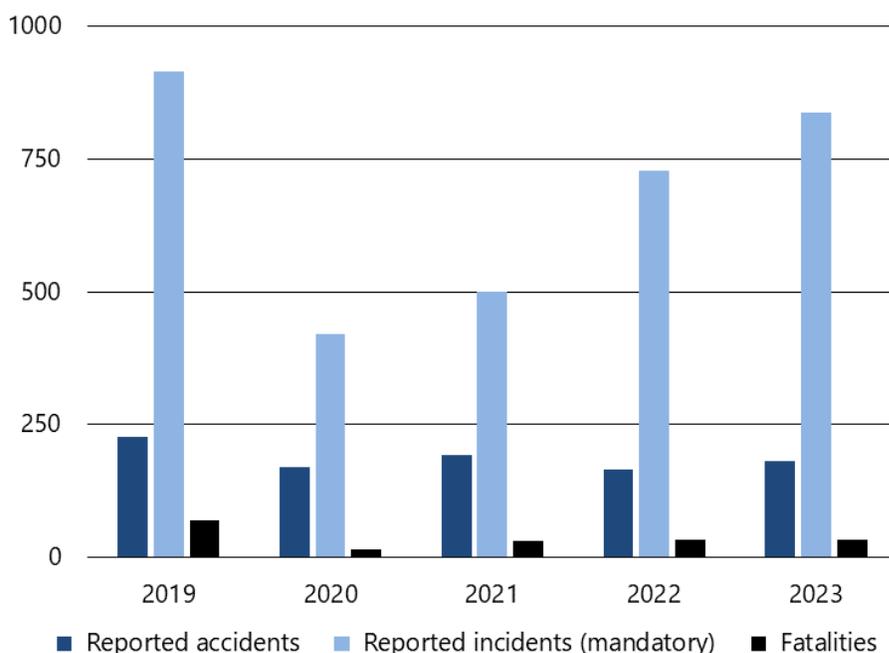
- Air Line Pilots Association annual conference
- Association québécoise du transport aérien annual conference
- Air Transport Association of Canada annual conference
- Banff Pipeline Workshop
- Canadian Business Aviation Association convention
- Canadian Owners and Pilots Association annual conference
- Canadian Ferry Association annual conference
- Canadian Maritime Advisory Council annual and semi-annual conferences
- Helicopter Association of Canada annual conference
- Railway Association of Canada and Association québécoise des transports Rail Symposium

Air transportation safety

The year in review

The Transportation Safety Board of Canada (TSB) received 1020 reports of air occurrences under the *Transportation Safety Board Regulations* (TSB Regulations) in 2023 (182 accidents and 838 incidents), including 33 fatalities (Figure 3).

Figure 3. Air transportation accidents, incidents, and fatalities, 2019 to 2023



The 2023 total of 182 reported accidents is a 10% increase over the previous year's total of 166 accidents and 17% below the yearly average of 220 accidents reported in the prior 10 years (2013–2022). Most of the accidents in 2023 (169) took place in Canada and involved Canadian-registered aircraft. In general, the number of air transportation accidents has decreased in the last decade.

Of the 182 accidents, 19 were fatal accidents with a total of 33 fatalities. This represents a slight reduction from the 24 fatal accidents with 34 fatalities in 2022 and is 24% below the average of 25 fatal accidents involving 40 fatalities over the ten-year average (2013–2022). Thirteen of the 33 air transportation fatalities in 2023 involved commercial operations: four of them under air taxi regulations (*Canadian Aviation Regulations* [CARs] 703), four under aerial work (CARs 702), and five under flight training operations (CARs 406). There were no fatalities involving airline operations (CARs 705) or commuter operations (CARs 704) in 2023. The remaining 20 (of 33) fatalities in 2023 were linked to privately registered aircraft and involved recreational operators.

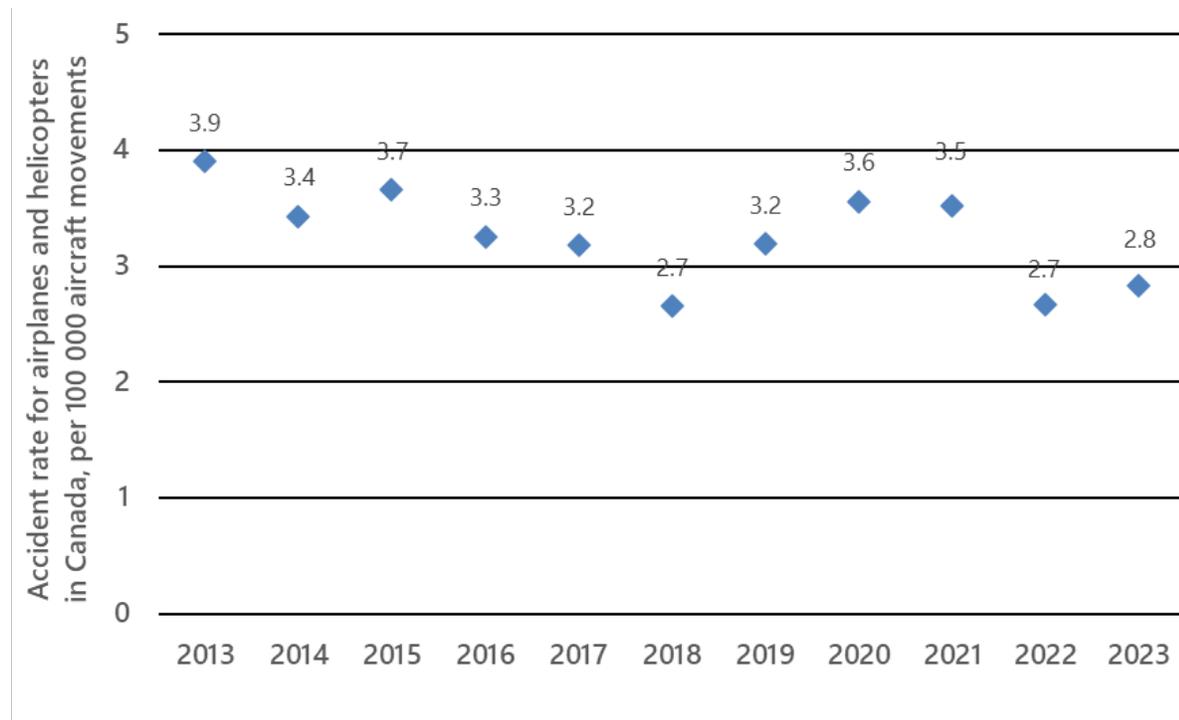
Two accidents in 2023 involved a release of dangerous goods. This is below the average of six per year over the previous 10 years.

In addition, 838 air transportation incidents were reported under the TSB Regulations. This represents an increase of 15% from the 728 that were reported in 2022 and is 13% above the average of 742 incidents per year between 2013 and 2022. Most reportable incidents in 2023 (567 or 68%) occurred in Canada and involved Canadian-registered aircraft.

Accident rate: A measure of air transportation safety

The overall air transportation accident rate of 2.8 accidents per 100 000 aircraft movements in 2023 is based on 156 accidents in Canada involving Canadian- and foreign-registered airplanes and helicopters (excluding ultralights, gyroplanes, gliders, and unmanned air vehicles) and the estimated 5.502 million movements at Canadian airports. The accident rate decreased from 3.9 accidents per 100 000 aircraft movements in 2013 to a low of 2.7 in both 2018 and 2022 before rising slightly again in 2023. While the decrease in this period is not statistically significant, the accident rate is among the lowest recorded by the TSB since it began measuring an accident rate by movements in 2004 (Figure 4).

Figure 4. Accident rate for Canadian-registered airplanes and helicopters in Canada, per 100 000 aircraft movements, 2013 to 2023



Air transportation investigations

TSB investigators deployed to 42 air transportation occurrences in 2023–24 (six fewer than in 2022–23), began 47 investigations, and completed 26 investigations (tables 8 and 9).

Table 8. TSB air transportation safety investigation activities, 2022–23 and 2023–24

Activities	2022–23	2023–24
Deployments	48	42
Investigations started	34	47
Investigations completed	39	26
Investigations in progress on 31 March of each year	32	53

Table 9. Air transportation safety investigations completed, 2022–23 and 2023–24

Class (investigation type)	Completed investigations		Completion target (days)	Average duration (days)	
	2022–23	2023–24		2022–23	2023–24
1 (safety issue)	0	0	730	n/a	n/a
2 (complex)	2	1	600	1073	1026
3 (detailed)	17	8	450	517	552
4 (limited scope)	20	17	220	208	230

A number of reports highlight this past year’s most significant air safety investigations.

Reducing the risks that persist in commercial helicopter operations

In its investigation report ([A21C0038](#)), the TSB found that insufficient regulatory requirements and defences to protect against loss of visual references led to the fatal 2021 crash of an Airbus AS350 helicopter on Griffith Island, Nunavut, which killed all three on board—the pilot, an aircraft maintenance engineer, and a biologist.

The investigation found that as the helicopter approached the highest elevation on Griffith Island, the uniformly snow-covered and featureless terrain, an overcast sky, and snow squalls likely created flat light and whiteout conditions. This led to an unexpected loss of visual reference to the horizon, also known as inadvertent flight into instrument meteorological conditions (inadvertent IMC). While the pilot was likely attempting to visually manoeuvre the helicopter in response to inadvertent flight into IMC, an unintentional descent resulted in the helicopter colliding with terrain.

The Board issued four recommendations to Transport Canada (TC) to:

- require commercial helicopter operators to ensure pilots possess the skills necessary to recover from inadvertent flight into IMC. [A24-01]

- require commercial helicopter operators to implement technology that will assist pilots with the avoidance of, and recovery from, inadvertent flight into IMC. [A24-02]
- require private and commercial operators conducting single-pilot operations to develop standard operating procedures based on corporate knowledge and industry best practices to support pilot decision-making. [A24-03]
- enhance the requirements for helicopter operators that conduct reduced-visibility operations in uncontrolled airspace to ensure that pilots have an acceptable level of protection against inadvertent flight into IMC accidents. [A24-04]

Runway incursion and risk of collision at Toronto/Lester B. Pearson International Airport

The TSB released its investigation report ([A2200146](#)) into the 2022 nighttime runway incursion and risk of collision at Toronto/Lester B. Pearson International Airport.

A maintenance vehicle crossed the displaced threshold of an active runway, even though its driver had received and read back an instruction to hold short of the runway. At the time of the runway incursion, an Air Canada Boeing 737 was on final approach for the runway. The air traffic controller, who was watching the approaching aircraft through the window of the control tower, observed the incursion as it was happening and instructed the crew of the aircraft to go around for another approach. The flight crew complied, and the aircraft landed uneventfully following a second approach.

The [risk of collisions from runway incursions](#) has been on the [TSB Watchlist](#) since 2010. This occurrence illustrates how a lapse in attention by even an experienced airport maintenance vehicle driver can result in a runway incursion.

The investigation found that the driver’s attention was split between his driving duties and the planning of the upcoming tasks that he would be supervising. As a result, he was paying less attention to monitoring the route for hazards. As well, because the driver had crossed the runway at the displaced threshold many times without stopping, the mental model he developed did not include stopping at the holding position, even though he read back the instruction to hold short. Given the driver’s split attention, the visual cues that were available to designate the holding position were not salient enough to alter his mental model and stop him from entering the runway.

Undetected damage led to 2021 landing gear failure in Montréal, Quebec

The TSB investigation ([A21Q0138](#)) into the December 2021 occurrence in which an Air Canada Airbus A330-343’s right main landing gear collapsed upon touchdown at Montréal/Pierre Elliott Trudeau International Airport determined that a pre-existing condition led to the landing gear failure.

Upon landing, one of two cracks that emanated from a previously undetected area of overheating spread rapidly and resulted in the bogie beam (a structural element that connects an assembly of two or more wheels to the same shock strut on the landing gear) breaking into several pieces. No

longer supported by the wheels, the shock strut dragged along the runway until the aircraft came to a rest.

A review of past occurrences revealed that, a few days before the occurrence, while the Airbus aircraft was taxiing for takeoff, one of the bearings on the right main landing gear seized, causing localized overheating. The procedures in place at the time of the incident allowed for the replacement of the affected parts without a thorough damage assessment. The aircraft was then returned to service, despite the presence of undetected damage to the landing gear.

Following this occurrence, Airbus modified the A330 maintenance manual, requesting that operators contact them if damage to the landing gear bogie beam or bushings is discovered. Air Canada subsequently incorporated Airbus' related modified maintenance manual tasks into its publications and issued a maintenance alert in October 2023 to all internal maintenance teams involved with A330 landing gear engineering management. The maintenance alert detailed information relating to the investigation into the A330 landing bogie beam failure and provided a detailed breakdown of the investigation. It also included information on the previous bearing failure on the same aircraft.

Undetected defect on helicopter led to engine failure and collision with terrain near Port McNeill, British Columbia

The TSB investigation ([A22P0023](#)) into the fatal 2022 collision with terrain involving a helicopter near Port McNeill, British Columbia, found that an undetected flaw created during the manufacturing process caused a compressor wheel to fail, leading to engine failure.

The helicopter was conducting slinging operations when, shortly after releasing a bundle of cedar blocks, the aircraft experienced an engine failure. The pilot broadcasted a distress call and, within a few seconds, the helicopter collided with terrain. The pilot was fatally injured, and the helicopter was substantially damaged.

The investigation determined that shrinkage voids developed near the inner circumference of the engine's sixth stage compressor wheel during the manufacturing process and went undetected using the existing inspection methods. The affected compressor wheel eventually failed when two separate fractures, one due to fatigue caused by the shrinkage voids and the other due to overstress, occurred. This resulted in a catastrophic engine failure and the subsequent impact with the ground.

The investigation also found that the engine failure occurred shortly after the helicopter had released a load of cedar blocks from a 180-foot longline. Therefore, the helicopter likely had insufficient height and forward speed to conduct a successful autorotation. As a result, the helicopter impacted the terrain with significant vertical speed, causing substantial damage to the helicopter. If single-engine helicopters routinely operate with unsafe height and airspeed combinations, the likelihood of a successful landing after an engine failure is significantly reduced.

Following this occurrence, the engine manufacturer re-issued a Commercial Service Letter, which includes a recommendation that its customers convert the compressor to the new wheel design during the next overhaul.

Air transportation safety advisories and safety information letters

The TSB issued one air transportation safety advisory letter as part of its investigations in 2023–24.

Recurring failure issue with Kaman K-1200 helicopter servo flap

As part of the ongoing TSB investigation ([A21P0107](#)) into the 2021 helicopter collision with water in the vicinity of Killam Bay, British Columbia, the TSB issued [Air Transportation Safety Advisory Letter A21P0107-D1-A1](#) to inform TC of identified unsafe conditions and suggest actions that must be taken to reduce the risks to safety.

Following the accident, the investigation recovered three of the four helicopter servo flaps. The aft body of one of those servo flaps had separated from the spar, although it was not recovered. TSB laboratory examination of the recovered portion of this servo flap indicated that it experienced fatigue/progressive fractures before the occurrence.

Issued in July 2023, the letter, directed to TC Civil Aviation, aims to raise awareness of servo flap failures on Kaman K-1200 helicopters. It also noted that the U.S. National Transportation Safety Board had previously investigated two accidents—one in 2010 and the other in 2020—that involved the catastrophic failure of the Kaman K-1200 main rotor systems. In both accidents the helicopter was destroyed, the pilot fatally injured, and investigators found that the aft body of one servo flap had separated from the spar. Additionally, in the 2020 case, there was evidence of a progressive crack that initiated at the inboard end before propagating outboard.

Progress on outstanding recommendations

Of the 31 responses to air transportation safety recommendations that the Board assessed in 2023–24, two were closed: one was closed after being assessed as Fully Satisfactory ([A21-01](#)), and the other was closed as Satisfactory in Part ([A07-06](#)).

The remaining 29 recommendations reassessed by the Board in 2023–24 obtained the following ratings: Satisfactory Intent (9); Satisfactory in Part (9), including 1 Dormant; Unable to Assess (4), including 1 Dormant; and Unsatisfactory (7), including 3 Dormant.

Three TSB recommendations ([A90-81](#), [A90-83](#), and [A90-84](#)) aimed at reducing the risks that persist in commercial helicopter operations issued over three decades ago were reassessed in March 2024. TC has yet to implement adequate measures to address the safety deficiencies outlined in these recommendations and has maintained that the most effective means of mitigating the underlying



safety deficiencies is to avoid flying helicopters into adverse weather conditions when operating under visual flight rules. However, the recent occurrences involving commercial helicopters flying into instrument meteorological conditions underscore the ongoing relevance and urgency of these recommendations. Therefore, the Board assessed the overall responses to the recommendations as Unsatisfactory. Additionally, the status of these recommendations was designated Dormant as these safety issues are articulated in more recent recommendations issued in February 2024 which supersede recommendations A90-81, A90-83, and A90-84. The new recommendations A24-01, A24-02, and A24-04 make up three of the four recommendations issued to TC following the investigation report ([A21C0038](#)) into the Griffith Island occurrence.

The issue of runway overruns is on the [TSB Watchlist](#) and is the subject of Recommendation [A07-06](#) to TC, which was issued as a result of investigation [A05H0002](#). The Board recommended that TC require all Code 4 runways to have a 300 m runway end safety area or a means of stopping aircraft that provides an equivalent level of safety. While the Board acknowledges TC's efforts to reduce the risk of runway overruns at Canada's major airports, it remains concerned that these regulations do not apply to smaller airports and considers TC's response to be Satisfactory in Part and closed it after reassessing it in March 2024.

In 2020, the TSB issued two recommendations to TC following the investigation ([A18Q0030](#)) into a runway overrun on landing. These recommendations ([A20-01](#) and [A20-02](#)) aim to review and simplify operating minima for approaches and landings at Canadian aerodromes, and to introduce a mechanism to stop approaches and landings that are actually banned. TC's response to these recommendations shows that progress continues to be made toward simplifying operating minima for approaches and landings at Canadian aerodromes. Consequently, the recommendations were reassessed as showing Satisfactory Intent.

As a result of the air transportation safety issue investigation ([A18Q0140](#)) into occurrences in Quebec and Nunavut involving runways undergoing construction that were reduced in width, the Board recommended that NAV CANADA make available, in a timely manner, graphic depictions of closures and other significant changes related to aerodrome or runway operations to accompany the associated NOTAMs so that the information communicated on these hazards is more easily understood ([A21-01](#)). As of June 2023, NAV CANADA provided updates on its planned activities to address this recommendation, including the update of the Aeronautical Information Publication (AIP) Supplements (AIP SUP); its campaign to increase awareness of the proper use of AIP SUP; and the development of a campaign to increase awareness of the obligation of aerodrome operators. The Board is pleased with NAV CANADA's comprehensive and timely actions to improve NOTAM publishing procedures in Canada and believes that these changes have substantially reduced the risk associated with the safety deficiency identified in Recommendation A21-01. The response to this recommendation was reassessed and found to be Fully Satisfactory, and the recommendation was closed.

The TSB investigated ([A21W0089](#)) into a fatal crash near Lacombe, Alberta, in which cardiovascular disease was a contributing factor to the pilot's death. While it could not be determined whether this resulted in an in-flight incapacitation, or in the pilot's death before or after

the crash, the investigation found that there was no framework in place at TC to routinely review the guidance document for medical examiners. As a result, the Board issued Recommendation [A23-01](#), for TC to establish a framework for routine review and improvement to the Handbook for Civil Aviation Medical Examiners to ensure it contains the most effective screening tools for assessing medical conditions such as cardiovascular health issues. The recommendation was reassessed by the Board in August 2023 and considered to show Satisfactory Intent, as TC began the process of replacing the Handbook with a format that provides a more flexible way of updating guidance on specific topics as the need arises.

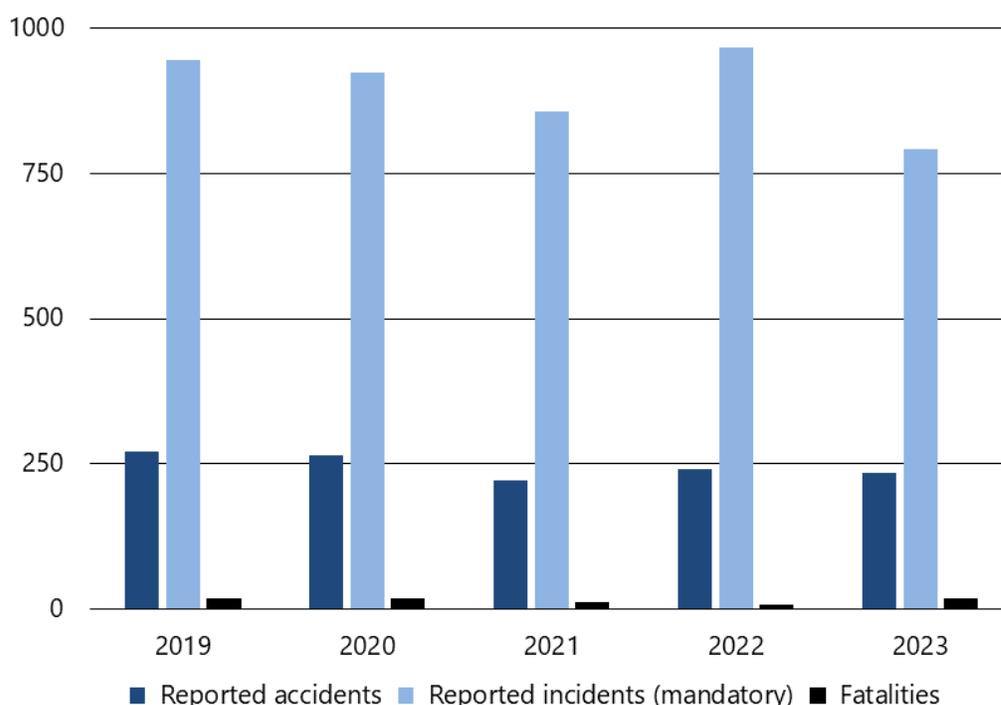
For all active recommendations, the TSB will continue to monitor the progress of planned actions and call for action to reduce or eliminate these deficiencies.

Marine transportation safety

The year in review

The Transportation Safety Board of Canada (TSB) received 1027 reports of marine transportation occurrences in 2023 (235 accidents and 792 incidents), including 18 fatalities.

Figure 5. Marine transportation accidents, incidents, and fatalities, 2019 to 2023



The 235 reported marine transportation accidents represent a decrease from the 244 accidents in 2022 and are below the 10-year average of 274. In 2023, 84% of accidents were shipping accidents (e.g., when a ship sinks, founders, or capsizes), slightly more than 82% on average over the previous 10 years. The remaining 16% of accidents in 2023 were accidents aboard a ship (e.g., when a person is killed or seriously injured when boarding a ship or by falling overboard), just below the 10-year annual average of 18%.

The 18 marine transportation fatalities are more than the 2022 total of seven and the 10-year average of 14. Of the 18 fatalities, 10 involved shipping accidents. Over the previous 10 years, fatalities have been evenly divided between shipping accidents and accidents aboard a ship.

As in previous years, a high proportion of the fatalities (11 of the 18) was related to commercial fishing (i.e., Canadian-flagged vessels in Canadian waters). These fatalities underline why commercial fishing safety remains on the [TSB's Watchlist](#).

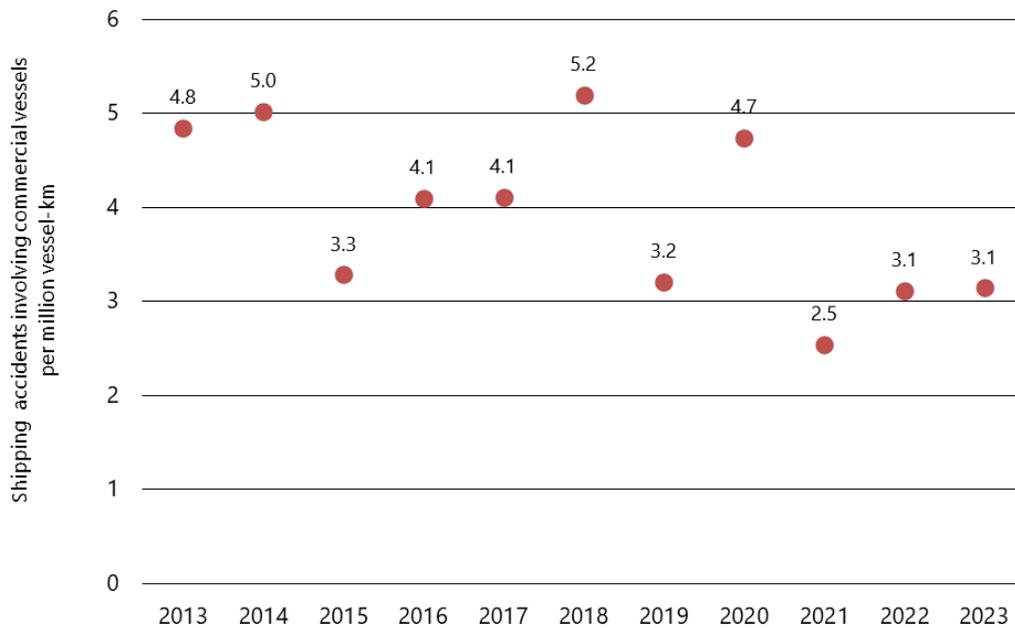
There were 227 vessels involved in the 197 shipping accidents that took place in 2023, similar to the 232 vessels that were involved in the 200 shipping accidents in 2022.

The 792 marine transportation incidents reported to the TSB in 2023 represent an 18% decrease from 2022 and are 6% below the 10-year average of 845. As in previous years, most reportable incidents (80%) were related to the total failure of machinery or technical systems. The increase in incidents of this type is due largely to changes made in 2014 to TSB reporting requirements.

Accident rate: A measure of marine transportation safety

According to Transport Canada (TC), 2023 marine activity (i.e., commercial vessel kilometres) for Canadian commercial non-fishing vessels with a gross tonnage of over 15, excluding passenger vessels and cruise ships, was 12% above the 2013-22 average. The 2023 accident rate was 3.1 accidents per million commercial vessel-kilometres, lower than the 2013-22 average of 4.0.

Figure 6. Shipping accident rate, Canadian commercial non-fishing vessels, 2013 to 2023



Marine transportation investigations

In 2023–24, the TSB deployed to nine marine transportation occurrences (three fewer than in 2022–23), began eight investigations, and completed eight (tables 10 and 11).

Table 10. TSB marine transportation safety investigation activities, 2022–23 and 2023–24

Activities	2022–23	2023–24
Deployments	12	9
Investigations started	9	8
Investigations completed	10	8
Investigations in progress on 31 March of each year	17	17

Table 11. Marine transportation safety investigations completed, by type of investigation, 2022–23 and 2023–24

Class (investigation type)	Completed investigations		Completion target (days)	Average duration (days)	
	2022–23	2023–24		2022–23	2023–24
1 (safety issue)	0	0	730	n/a	n/a
2 (complex)	1	1	600	1208	963
3 (detailed)	7	3	450	791	909
4 (limited scope)	2	4	220	345	378

A number of reports highlight this past year’s most significant marine safety investigations.

Systemic issues in commercial fishing continue to cost the lives of fish harvesters

The investigation into the 2021 fatal sinking of the fishing vessel *Tyhawk* ([M21A0065](#)) highlighted a number of systemic factors including vessel modifications and their impact on stability; the lack of, or failure to use, lifesaving equipment; and inadequate regulatory oversight, including fisheries resource management. The *Tyhawk* departed from Chéticamp, Nova Scotia, to set traps on opening day for snow crab fishing in the Gulf of St. Lawrence. As the vessel neared the fishing grounds, the weather became more severe, as did the vessel’s rolling movements, which allowed water to accumulate on board. Shortly after, following a significant roll to starboard, the main deck submerged and allowed more water to enter, eventually leading to the capsizing of the vessel.

The investigation determined that the vessel’s stability was compromised in part by the addition of a removable deck used for snow crab fishing, which had not been evaluated for its impact on the vessel’s stability. Also, when the vessel capsized, the crew could not reach the lifesaving equipment, such as personal floatation devices, immersion suits, and the life raft. Fatigue was also found to have been a factor contributing to this occurrence, as was the master’s perception of risk in the planned fishing operation, which was influenced by several pressures, including economic and community incentives, approvals and certificates, and previous successful experiences.

As a result of its investigation, the TSB issued a total of three recommendations. The first two recommend that TC

- introduce objective criteria to define major modifications to small fishing vessels and other small commercial vessels [M23-06], and
- require that planned modifications to small fishing vessels and other small commercial vessels be assessed by a competent person, that all records of modifications to these vessels be maintained, and that the records be made available to the Department. [M23-07]

The third recommendation is directed to Fisheries and Oceans Canada, to ensure that policies, procedures, and practices include comprehensive identification of hazards and assessment of associated risks to fish harvesters when fisheries resource management decisions are being made and to integrate independent safety expertise into these processes. [M23-08]

Key safety issues from the TSB Watchlist continue to put at risk the lives of thousands of Canadians working or traveling on our waterways.

The TSB has been monitoring [commercial fishing safety](#) since 1999 and highlighting this issue in its Watchlist since 2010.

[Fatigue management](#) varies substantially from one owner and type of vessel to the next and has shown to be problematic.

The current poor and ineffective [regulatory surveillance](#) cannot guarantee that operators are compliant with regulations.

Proper [safety management](#) is vital in ensuring that operators manage their safety risks effectively.

TSB raises safety concern following investigation into the sinking of the *Atlantic Destiny*

The TSB investigation ([M21A0041](#)) into the sinking of the fishing vessel *Atlantic Destiny* prompted the Board to issue a [safety concern](#) regarding insufficient crew knowledge on how to properly use carbon dioxide (CO₂) fixed fire suppression systems. In March 2021, with 31 crew on board, the *Atlantic Destiny* sustained a catastrophic engine failure about 120 nautical miles south of Yarmouth, Nova Scotia. The shaft generators and associated machinery exploded, causing a fire and damage that led to flooding in the engine room. Everyone was evacuated by search and rescue authorities, and the following day, the *Atlantic Destiny* sank.

The investigation found that the automatic and manual activation of the engine safety system failed to prevent the engine speed from increasing beyond the design limits of the engine, causing a catastrophic failure and subsequent fire.

The crew used the engine room's fixed fire suppression system, which releases a heavy blanket of CO₂ that displaces air and reduces the oxygen level to a point where combustion cannot occur when the space is properly sealed. However, they re-entered the sealed space on several occasions to investigate the sound of water coming from the engine room and to access the auxiliary generator. These actions re-introduced oxygen into the space, reducing the effectiveness of the suppression system and, consequently, the fire re-ignited.

Although crew members followed the documented procedures for use of the CO₂ fire suppression system, they were unaware of the need to wait for the space to cool before re-entering. A lack of

understanding of the requirements for using CO₂ fire suppression systems has been a factor in several other occurrences in Canada and worldwide.

A gap in the oversight of occupational health and safety on fishing vessels registered in Canada's North

The TSB issued a recommendation aimed at enhancing commercial fishing safety in Canada's North following the investigation ([M21C0214](#)) into the death of a crew member who was pulled overboard the fishing vessel *Suvak* in Davis Strait, Nunavut.

On August 26, 2021, the *Suvak* was nearing the end of a two-week fishing trip when one of two crew members who were hauling and setting nets was pulled overboard after his arm became entangled in a buoy line. The crew member was recovered from the water and later pronounced dead.

The investigation identified risks related to the absence of fatigue management plans and risk assessments for operating procedures. In this occurrence, the two crew members setting the nets had been awake for over 21 consecutive hours and had only taken a 1.75-hour break. As a result, they were experiencing sleep-related fatigue from a combination of acute and chronic sleep disruption, continuous wakefulness, and circadian rhythm disruptions, which reduced their cognitive abilities, including their ability to remain vigilant against risks.

The TSB found a gap in the oversight of occupational health and safety (OHS) on fishing vessels registered in the Canadian territories, including the *Suvak*. Enhanced OHS oversight of fishing vessels could be better achieved through a coordinated and harmonized approach between federal and territorial authorities.

The Board recommended that TC, in collaboration with Employment and Social Development Canada and the territorial governments, review the occupational health and safety oversight of fishing vessels registered in the territories to ensure effective workplace safety oversight. (M23-09)

Marine transportation safety advisories and safety information letters

The TSB issued one marine transportation safety advisory letter and one marine transportation safety information letter as part of its investigations in 2023–24.

Unsafe loading of lobster fishing vessels leads to loss of lives in New Brunswick

The TSB issued [Marine Transportation Safety Advisory Letter 02/23](#) to TC, Fisheries and Oceans Canada (DFO), and WorkSafeNB, following the fatal accident where two crew members fell overboard from the fishing vessel *Tracy Dawn* (M23A0107).

The lobster fishery in Eastern Canada is competitive, and it is common practice for fish harvesters to load their vessels with as many traps as possible on opening day, which can lead to vessels being loaded beyond their safe operating limits and to load configurations that do not allow crew to work



safely on deck. In this occurrence, crew members were unable to walk on deck to access the stern, and the wheelhouse door was blocked by the stacks of traps, as was the vessel's life ring. Although the *Tracy Dawn* is registered with TC, there is no record indicating that the vessel had ever been inspected. The *Tracy Dawn* had no written safe work procedures, which are required under section 106 of the *Canada Shipping Act, 2001*. As well, there were no records that a formal stability assessment had been completed for the *Tracy Dawn*, and maximum loads or loading plans for the vessel had not been calculated or verified.

This is not the first time the Board has seen such an occurrence. The TSB completed the Safety Issues Investigation ([M09Z0001](#)) on the causes of fatal fishing vessel accidents in 2012 and identified several systemic factors requiring attention, among them unsafe work practices and inadequate regulatory oversight. The TSB also has eight outstanding recommendations related to fishing vessels. In particular, Recommendation [M16-03](#) recommends that all small fishing vessels undergo a stability assessment and that TC establish standards to ensure that the stability information is adequate and readily available to the crew. The Board has assessed action taken to address this recommendation as Unsatisfactory.

Improper installation of pilot cylinder manual release lever on ferry in Prince Edward Island

As part of the ongoing investigation ([M22A0258](#)) into the 2022 fire on the roll-on/roll-off passenger ferry *Holiday Island* during its approach to Wood Islands, Prince Edward Island, the TSB issued [Marine Transportation Safety Information Letter 03/23](#) to TC.

So far, the investigation has identified potential issues regarding the location of the installation of the CO₂ smothering system on board the *Holiday Island*, which was obstructed from being activated manually. The proper functioning and operation of a smothering system is critical to respond to an emergency. The information letter was sent ahead of the completion of the investigation to ensure remedial action was taken to address the safety issue. The TSB investigation was ongoing at the end of the fiscal year.

Progress on outstanding recommendations

The Board assessed the progress of 19 marine transportation safety recommendations in 2023–24, and one was closed as Fully Satisfactory ([M99-02](#)). The 18 remaining recommendations assessed were rated as Satisfactory Intent (5); Satisfactory in Part (8), including 1 Dormant; and Unsatisfactory (5).

The TSB investigated ([M96M0144](#)) the injury of a crew member on the fishing vessel *S.S. Brothers* off Yarmouth, Nova Scotia, that occurred in October 1996. From 1992 to 1996, there had been over 150 reportable accidents on board fishing vessels, and over 40 injuries and at least three fatalities from accidents involving fishing gear and moving machinery. Following its investigation, the Board issued Recommendation [M99-02](#), which recommended that provinces review their workplace



legislation with a view to presenting it in a manner that will be readily understood by those to whom it applies, and to help ensure that the enforcement mechanism and the regulatory regime complement each other. Previous responses received from the provinces had been reviewed and assessed as Fully Satisfactory. In August 2023, the Board reviewed Ontario's response and acknowledged the various initiatives taken by the Ministry of Labour, Immigration, Training and Skills Development (MLITSD) in addressing this recommendation, including the creation of website content and resources in multiple languages, and targeted outreach conducted in 2022. The Board believes that sufficient resources have been taken by the MLITSD in addressing this recommendation and therefore considers its response to this recommendation as Fully Satisfactory.

As a result of the investigation ([M20A0160](#)) into the 2020 fatal sinking of the fishing vessel *Sarah Anne* in Newfoundland and Labrador, the TSB recommended that DFO require that any Canadian vessel that is used to commercially harvest marine resources have a current and accurate TC registration ([M22-01](#)). Vessel registration gives TC the opportunity to provide safety oversight and guidance to fishing vessel owners. This recommendation is meant to push for improved coordination between the two primary federal departments that interact with the commercial fishing sector. Their combined efforts can work to increase the awareness and compliance with safety requirements among all commercial fish harvesters. While this recommendation has yet to be closed, both TC and DFO have taken significant steps to respond to it, such as a reminder of the vessel registration requirement for all renewals of fishing licences. TC has noted an increase in vessel registration since the recommendation was issued. Therefore, the Board deems the response to this recommendation to be Satisfactory in Part.

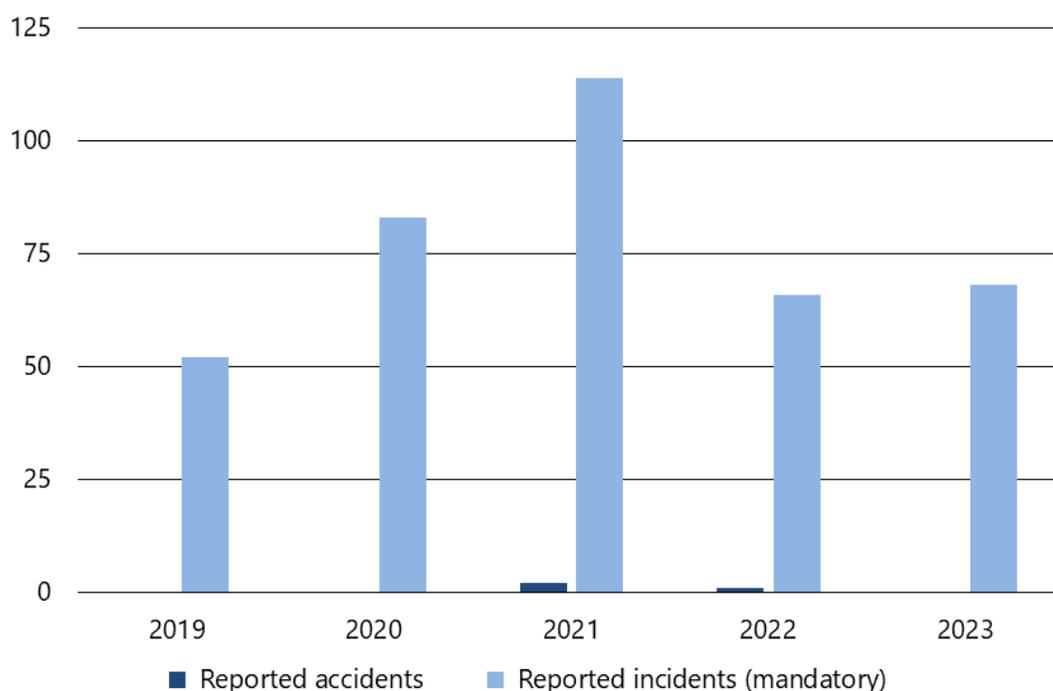
For all active recommendations, the TSB will continue to monitor the progress of planned actions and call for action to reduce or eliminate these deficiencies.

Pipeline transportation safety

The year in review

The Transportation Safety Board of Canada (TSB) received 68 reports of pipeline transportation occurrences in 2023, all of which were incidents. There were no pipeline accidents in 2023. There were no fatalities arising directly from the operation of any federally regulated pipeline, as has been the case since the TSB's inception in 1990.

Figure 7. Pipeline transportation accidents and incidents, 2019 to 2023



This number of occurrences in 2023 (68) is unchanged from 2022 and 33% below the average of 101 for the previous 10 years. While there were no pipeline accidents in 2023, the average number of accidents in the prior 10 years was two per year.

Of the 68 occurrences in 2023, 17 involved a release of product:

- This was the smallest number of occurrences with product release in the past 11 years.
- These 17 occurrences are 25% of the total (68) occurrences in 2023, well below the 10-year average of 50%.
- Most (15) of these 17 occurrences involved a release of hydrocarbon gas (88%), which has been the case each year since 2015.
- Two occurrences involved the release of low vapour pressure hydrocarbons.

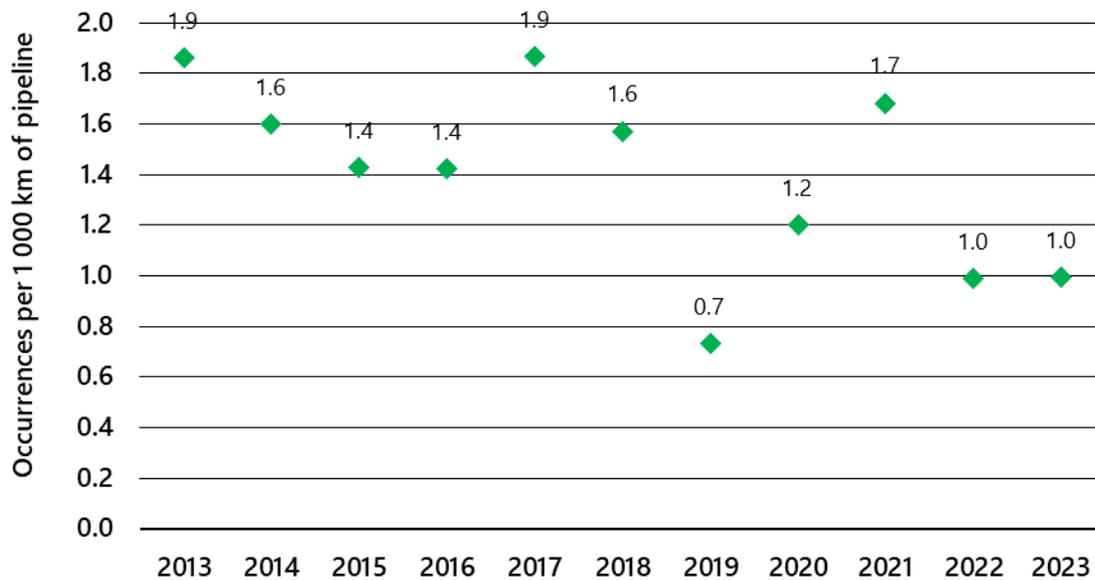
The [TSB monthly and annual statistics on pipeline occurrences](#) contain more information on product releases during the year.

In 2023, 15 occurrences involved geotechnical, hydrotechnical, or environmental activity (e.g., slope movements or river erosion), just one more than the number reported in 2022, and slightly below the average of 18 such events per year over the previous 10 years. There were 17 reports of pipelines being contacted by an object in 2023 compared with the average of nine reports per year during the previous 10 years; there were also four occurrences with unauthorized third-party activity, on par with a 10-year average of about four per year.

Occurrence rate: A measure of pipeline transportation safety

There were 68 200 km of federally regulated pipeline operating in Canada in 2023, according to the Canada Energy Regulator. The 68 pipeline transportation occurrences reported to the TSB for the year resulted in an occurrence rate per 1000 km of operating pipeline of 1.0. This is the same as the 2022 rate of 1.0 and below the average of 1.4 occurrences per 1000 km from 2013 to 2022.

Figure 8. Pipeline transportation occurrence rate, 2013 to 2023



Pipeline transportation investigations

TSB staff completed one investigation in 2023–24, a detailed Class 3 investigation that took 642 days to complete (tables 12 and 13).

Table 12. TSB pipeline transportation safety investigation activities, 2022–23 and 2023–24

Activities	2022–23	2023–24
Deployments	1	0
Investigations started	1	0
Investigations completed	1	1
Investigations in progress on 31 March of each year	1	0

Table 13. Pipeline transportation safety investigations completed, 2022–23 and 2023–24

Class (investigation type)	Completed investigations		Completion target (days)	Average duration (days)	
	2022–23	2023–24		2022–23	2023–24
1 (safety issue)	0	0	730	n/a	n/a
2 (complex)	0	0	600	n/a	n/a
3 (detailed)	1	1	450	527	642
4 (limited scope)	0	0	220	n/a	n/a

Below is this past year’s pipeline safety investigation.

Gas pipeline rupture and fire near Fox Creek, Alberta

The TSB investigation ([P22H0023](#)) into the 2022 rupture of a natural gas pipeline near Fox Creek, Alberta, found that external corrosion led to the explosion and fire.

On April 7, 2022, a natural gas pipeline, operated by NOVA Gas Transmission Ltd., ruptured and the escaping gas ignited, resulting in a fire that burned a 12 000 m² area before it self-extinguished after the flow of gas was stopped by the manual closure of valves.

The investigation found that the pipeline ruptured due to reduced pipe wall strength caused by external corrosion. The pipeline’s external coating system had degraded over time, exposing the surface of the pipe to the external soil environment. An impressed current cathodic protection system was installed to protect the pipe surface from corrosion in the event of degradation or failure of the external coating. In this occurrence, the cathodic protection system was not adequately protecting the exposed surface of the pipe as intended.

Following the occurrence, NOVA Gas Transmission Ltd. replaced the damaged sections of pipe and initiated steps to permanently shut down the entire pipeline.

Pipeline transportation safety advisories and safety information letters

The TSB issued no pipeline transportation safety advisories and no pipeline transportation safety information letters as part of its investigation in 2023–24.

Progress on outstanding recommendations

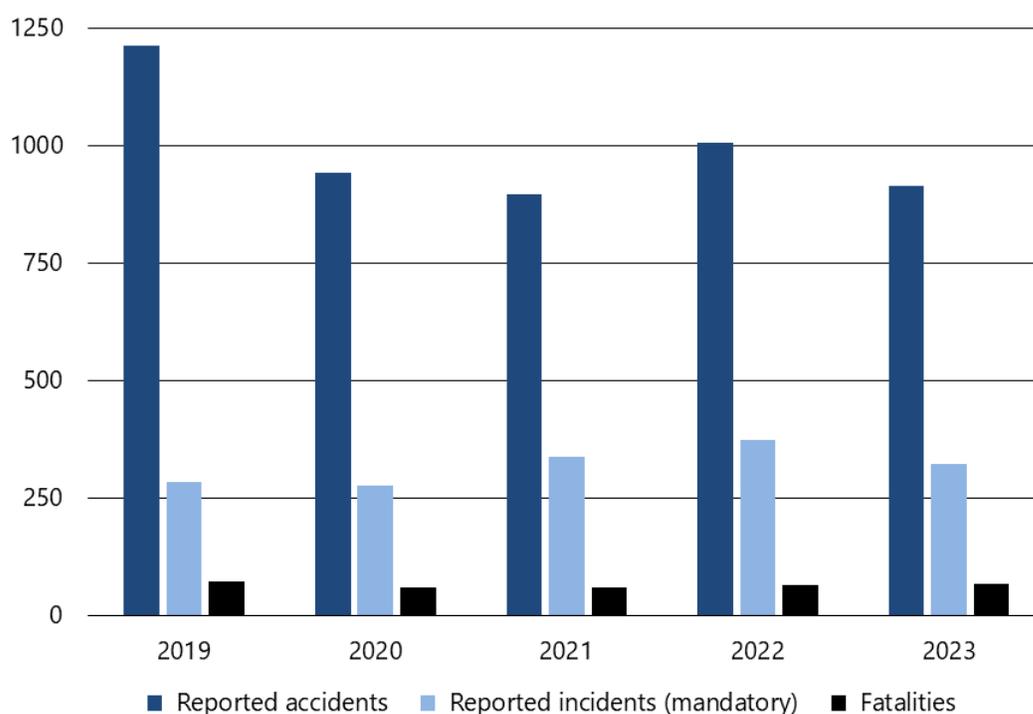
The Board did not issue any pipeline transportation safety recommendations in 2023–24 and had previously assessed all responses to pipeline transportation safety recommendations as Fully Satisfactory.

Rail transportation safety

The year in review

The Transportation Safety Board of Canada (TSB) received 1235 reports of rail transportation occurrences in 2023 (914 accidents and 321 incidents), including 67 fatalities.

Figure 9. Rail transportation accidents, incidents, and fatalities, 2019 to 2023



The 914 reported accidents represent a 9% decrease from 2022 and a 12% decrease from the 10-year average of 1039.

The 67 reported fatalities in rail transportation represents a slight increase compared to the 65 reported fatalities in 2022 but remains below the 10-year average of 68. Among these fatalities, 53 involved trespassers, compared to 51 in 2022 and the 10-year average of 41.

The number of crossing accident fatalities decreased in 2023 (13) compared to 2022 (14) and is lower than the 10-year average of 20.

Among all rail transportation accidents, 87 involved dangerous goods. This is down from 110 in 2022 and is lower than the 10-year average of 120. Six accidents in 2023 resulted in dangerous goods being released.

There were 321 rail transportation incidents reported to the TSB in 2023, a 14% decrease from 2022 (374). Movements that exceeded limits of authority incidents (i.e., when rolling stock occupies

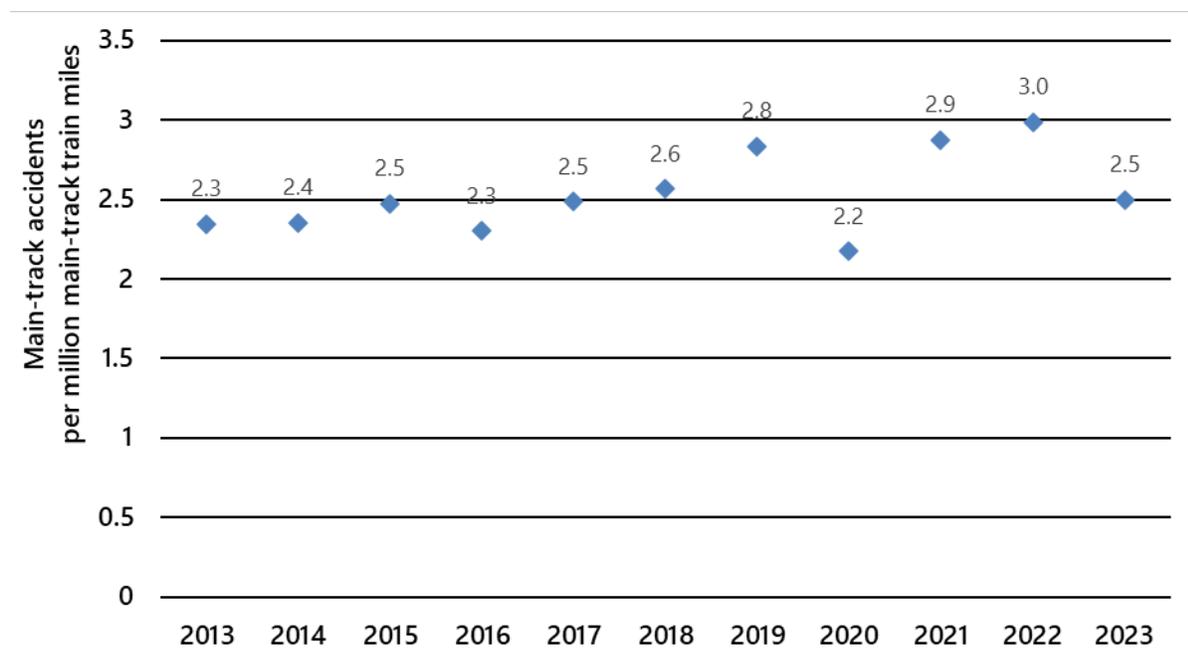


a main track or subdivision track, or track work takes place, in contravention of the *Canadian Rail Operating Rules* or any regulations made under the *Railway Safety Act*) accounted for 50% (161) of all rail transportation incidents in 2023; this is 27 more than in 2022 and above the 10-year average of 129.

Accident rate: A measure of rail transportation safety

According to Transport Canada (TC) data, 2023 main-track rail activity (i.e., non-yard) increased by 4% from 2022. The main-track accident rate in 2023 was 2.5 accidents per million main-track train-miles, a decrease from 3.0 in 2022 and below the 10-year average of 2.6.

Figure 10. Main-track accident rate, 2013 to 2023



Rail transportation investigations

The TSB deployed to 21 rail transportation occurrences in 2023–24, 13 more than in 2022–23, began 10 investigations, and completed eight (tables 14 and 15).

Table 14. TSB rail transportation safety investigation activities, 2022–23 and 2023–24

Activities	2022–23	2023–24
Deployments	8	21
Investigations started	6	10
Investigations completed	9	8
Investigations in progress on 31 March of each year	15	17



Table 15. Rail transportation safety investigations completed, 2022–23 and 2023–24

Class (investigation type)	Completed investigations		Completion target (days)	Average duration (days)	
	2022–23	2023–24		2022–23	2023–24
1 (safety issue)	0	0	730	n/a	n/a
2 (complex)	4	1	600	1162	1634
3 (detailed)	3	7	450	759	1048
4 (limited scope)	2	0	220	398	n/a

Risks associated with alcohol consumption before assuming safety-critical duties following 2021 head-on train collision in Prescott, Ontario

The TSB issued a safety concern regarding alcohol consumption in Canadian rail operations following its investigation ([R21H0114](#)) into the collision and subsequent derailment of two Canadian National Railway Company (CN) freight trains.

On September 2, 2021, a CN freight train was travelling to Toronto, Ontario, on the north main track of the Kingston Subdivision, carrying 202 cars loaded with double-stack containers. Along the way, the train was to pass by a hand-operated switch that provides access to an industrial spur track in the town of Prescott, Ontario. A CN switching assignment was waiting in the industrial spur track and had received permission from the rail traffic controller (RTC) to reverse the switch to line the assignment onto the main track. The crew of the first train realized the switch was reversed and attempted to stop by activating the locomotive’s emergency brake system. However, the assignment proceeded onto the spur track where it collided head-on with the freight train, causing substantial damage to both trains and destroying approximately 1000 feet of track.

The investigation determined that, at the time of the accident, the RTC had a complex workload, and his attention was diverted to other competing tasks. Also, the RTC’s mandatory post-accident alcohol testing results indicated that the RTC was either drinking alcohol at the beginning of the shift or had significant alcohol intake in the early morning of or the night before work. While CN has a workplace policy of zero tolerance for impairment at work, individuals are expected to self-assess and determine if the effects of alcohol have sufficiently diminished to be fit for duty. Alcohol impairment involving employees in safety-critical positions can have significant adverse outcomes, affecting the safety of crews, passengers, and the environment.

The findings of the investigation prompted the Board to issue a [safety concern](#) about railway employees in safety-critical positions performing their duties while under the influence of alcohol, given that no time period prohibiting the consumption of alcohol by such employees in Canada is required.

TSB issues safety concern after 2021 locomotive fire and trackside fire near Elko, British Columbia

The TSB issued a [safety concern](#) following its investigation ([R21V0144](#)) into a 2021 freight train locomotive fire that occurred near Elko, British Columbia.

On July 8, 2021, the mid-train locomotive of a Canadian Pacific Railway Company (CP) train experienced a mechanical failure that resulted in flames and embers emanating from the exhaust stack, which likely caused a trackside fire. Due to the locomotive's remote position in the train, the locomotive's fire went undetected until it was observed by the crew of an opposing train.

While fires on remotely located locomotives are not uncommon, they do not often migrate to the railway right-of-way. A review of fires reported to the TSB over the 10-year period prior to the occurrence identified 34 locomotive fires involving distributed power mid-train or tail-end remote locomotives, three of which are confirmed to have caused railway right-of-way fires.

To address the risks of fire during times of extreme fire danger, the rail industry developed the *Railway Extreme Heat and Fire Risk Mitigation Rules*, which were approved by the Minister of Transport and came into effect on June 15, 2022.

The Board is encouraged by the initiative the rail industry has taken in developing these rules and looks forward to improved management of the risks associated with railway operations during the fire season. However, the Board remains concerned that steps have not been taken to leverage and expand the use of existing on-board locomotive systems to monitor remote locomotives for common types of fires while trains are in operation.

Undetected broken rail led to the 2019 crude oil train derailment and fire near Guernsey, Saskatchewan

The TSB released its investigation report ([R19W0320](#)) into the derailment of a CP freight train near Guernsey, Saskatchewan, which resulted in the release of 1.77 million litres of crude oil.

On December 9, 2019, a CP crude oil unit train was proceeding on the Sutherland Subdivision when a train-initiated emergency brake application occurred. Shortly after, crew members observed a large explosion behind them as the head-end locomotive and first car separated from the train. Subsequent inspection determined that 33 cars derailed, of which 20 tank cars had breached and the released product ignited, resulting in a large pool fire that burned for nearly 24 hours.

The investigation determined that the rail had likely failed under a previous train, causing an undetermined length of rail to break away and separate from the track and expose the rail ends. The condition of the track components (i.e., anchors, ties, and ballast) did not provide adequate resistance to the rail forces initiated by the cold weather at the time of the accident, which contributed to the breaking of the rail. Despite regular track visual inspections and ultrasonic rail flaw detection testing, which exceeded regulatory requirements, the broken rail went undetected before the arrival of the train.



Following this accident and another serious CP oil unit train derailment ([R20W0025](#)) that occurred about two months later in the same area, the TSB issued two rail safety advisories (RSA) [[02/20](#), [03/20](#)] to TC. The advisories noted that, including these two investigations, the TSB had deployed to seven other train derailments involving tank cars carrying crude oil, and resulting in significant release of product. All seven derailments occurred as a result of a broken rail, broken joint bars, or other track infrastructure condition. Further, all these derailments occurred on a key route, on which the track was maintained in accordance with the *Rules Respecting Track Safety*.

The circumstances of this occurrence, and the six others noted in the RSAs, demonstrate that despite railways having detailed safety management system plans and risk assessments that identify mitigation strategies, there are often gaps in the risk assessment, and accidents sometimes occur before mitigations are fully implemented.

[Safety management](#) will remain on the Watchlist for the rail transportation sector until operators demonstrate to TC that their SMS is effective.

Incorrectly lined switch led to 2022 derailment of a freight train

The TSB released its investigation report ([R22D0106](#)) into the 2022 non-main-track derailment of a CN train in Huntington, Quebec.

On December 11, 2022, a CN freight train was travelling in the Carr siding on the CSX Transportation Montreal Subdivision. As the train approached the north siding switch leading on to the main track, the two head-end locomotives and six intermodal platforms derailed while travelling over a switch point derail linked to a radio-controlled switch system.

A derail is a physical defence that prevents any unauthorized movements or unattended rolling stock from entering the main track. In the derailing position, the device is designed to derail equipment rolling over it. The investigation determined that the locomotive engineer's attention was divided when he entered the code controlling the radio-controlled switch while performing other activities. Since the switch was not set in the reverse position allowing the train to enter the main track, the power-operated derail linked to the system remained in the derailing position.

After the incorrect switch position was selected, the switch target light then went from red to green, indicating that the switch was lined for the direct route instead of the reverse position. Additionally, the crew heard a radio message transmitted by the system, confirming the switch position. The train crew concluded that the auditory and visual confirmations issued by the power-assisted switch system corresponded to the required route for the train to leave the siding. The crew was unable to visually confirm the position of the derail due to darkness from the time of day and the distance from the switch point derail. The train continued to accelerate before derailing as it passed over the switch point derail.

Data recorded by locomotive voice and video recorders (LVVRs) enable TSB investigators to determine, objectively and reliably, the possible role of human factors in a railway occurrence. In analyzing the data from the lead locomotive's LVVR system, the TSB found that there was no voice recording from inside the cab. The lack of voice data from the locomotive cab's LVVR system meant



that it was impossible to determine the verbal communications between the train crew members during the occurrence.

The investigation found that the lack of audio was related to the georeferencing system, which allows the cab voice recording to be deactivated when the train is operating in the United States (U.S.) in order to comply with U.S. regulations. Because the accident occurred near the Canada–U.S. border, the system did not activate the audio recording from the microphones in the cab.

Prior to the release of the report, the TSB issued [Rail Safety Information Letter 01/23](#) to TC in February 2023. The letter stated that TC may wish to verify the functionality of LVVR systems operated by railway companies and confirm that all of the parameters required under the regulations are being correctly captured and recorded.

Rail transportation safety advisories and safety information letters

The TSB issued five rail transportation safety advisories and two rail transportation safety information letters as part of its investigations in 2023–24.

Changes to current signage and traffic lights are required to reduce the risks of railway crossing collisions in Saint-Jean-sur-Richelieu

As part of its investigation (R23D0056) involving a collision between a CN freight train and a tractor trailer, the TSB issued Rail Transportation Safety Information Letter 03/23 to the Ministère des Transports et de la Mobilité durable du Québec. The letter stated that in order to mitigate the risk of collision at this crossing, the Ministère des Transports et de la Mobilité durable might wish to consider identifying clearing zones on the roadway as well as installing corresponding signage near the crossing. The letter also stated that the Ministère might wish to consider the synchronization between traffic lights at nearby intersections and crossing automatic warning devices.

More stringent verification procedures required for electronic track occupancy permits

As part of the ongoing TSB investigation ([R22V0238](#)) into a collision between a CP freight train and a hi-rail vehicle (track unit) near Campbell Creek, British Columbia, the TSB issued Rail Transportation Safety Advisory Letter 04/23 to CP. The letter stated that CP may wish to consider the need for more stringent verification procedures for railway employees cancelling electronic track occupancy permits (TOP). As seen in the subject occurrence now under investigation, inadvertent cancellation of a TOP can have serious consequences.

More information will be made available once the report is released.

Importance of adequate supervision for newly qualified railway employees

As part of TSB investigation ([R23Q0022](#)) involving a derailment of a Quebec North Shore and Labrador (QNS&L) train, the TSB issued Rail Transportation Safety Information Letter 04/23 to QNS&L. The letter suggested that QNS&L consider revising its locomotive engineer training program to ensure that ongoing systematic supervision of new employees is performed in the post-qualification period. The letter also noted, in reference to this occurrence, that despite the locomotive engineer completing training and obtaining his qualifications, his level of experience was still limited, and he was still in a probationary period.

Limited use warning systems with walk lights increases the risk to safety for Canadians

The TSB issued Rail Transportation Safety Advisory Letter 05/23 to TC in August 2023 regarding its investigation (R23H0002) into the fatal collision between a VIA Rail Canada Ltd. passenger train and a vehicle at a private grade crossing near Gananoque, Ontario. The letter stated that TC might wish to ensure that all limited use warning systems with walk lights at crossings provide adequate protection, and that the instructions as to their operation are clear for crossing users. It also noted that the uniqueness of the design of limited use warning systems, with walk lights, and the absence of stop signs, increases the risk that motorists will misperceive or misinterpret the warning signals.

Supervision of trainees during yard switching operations

The TSB issued Rail Transportation Safety Advisory Letter 06/23 to TC during its investigation (R23D0045) into the fatal injury of a conductor trainee during rail switching operations at the Rivière-des-Prairies Yard in Montréal, Quebec. The letter stated that TC might wish to consider communicating with railway companies to ensure that their current training programs cover requirements for the supervision of new employees during their field training period, and that these requirements are implemented on a systematic and ongoing basis. The letter also noted that if crew members are unable to take immediate action in the event of an unsafe situation, trainees could find themselves in a vulnerable situation, which could increase the risk of accidents and lead to severe or fatal injuries.

Obstructed view of cameras in locomotive cab limits TSB investigation into train collision

As part of the ongoing TSB investigation ([R23D0108](#)) into the collision between a CN train and a stationary exo commuter train, the TSB issued Rail Transportation Safety Advisory Letter 07/23 to TC. The letter stated that, in order to comply with the provisions of the *Locomotive Voice and Video Recorder Regulations*, TC might wish to ensure that locomotive voice and video recorder (LVVR) systems are operational and capturing the required data. The letter also noted that the absence of video data in this occurrence could limit the TSB in its analysis of some of the activities that would have occurred on board the locomotive in the minutes preceding the occurrence.

More information will be made available once the report is released.

Recent collisions involving trains operating under Restricted signals in centralized traffic control territory

The TSB issued Rail Transportation Safety Advisory Letter 01/24 to TC, in relation to occurrences R23V0137, R23T0205 (Class 5 investigations for which no investigation report is produced), [R23D0108](#), and [R24C0020](#), all of which involved train collisions where the colliding train exceeded the restricted speed when operating under a Restricted signal. The letter acknowledged that, in a complex system such as rail transportation, even the most rigorous administrative defences may not cover every contingency or be uniformly interpreted by individuals. Therefore, to reduce the likelihood of collisions when trains operate under Restricted signals in centralized traffic control territory and to reduce the risks to train crews and the travelling public, as a priority, TC should work with the railway industry to address the limitations with existing administrative defences.

Progress on outstanding recommendations

Of the 10 responses to rail transportation safety recommendations the Board assessed in 2023–24, one was closed as Fully Satisfactory ([R22-01](#)). The 9 remaining responses to recommendations were assessed as Satisfactory Intent (7), and Satisfactory in Part (2), including 1 Dormant.

TSB Recommendation [R22-01](#), aimed at reducing the risk of uncontrolled movements through the implementation of periodic maintenance requirements for brake cylinders, following an investigation ([R19C0015](#)) into a fatal derailment, was reassessed by the Board in March 2024. TC revised the *Railway Freight and Passenger Train Brake Inspection and Safety Rules*, effective December 2025, by introducing the requirement to replace brake cylinders on freight cars every 14 years. This strengthens maintenance standards and will improve cold weather air brake performance on trains operating in mountain grade territory. Therefore, the Board considers the response to this recommendation to be Fully Satisfactory.

As a result of the investigation ([R19W0002](#)) into the main-track train collision and derailment of a CN train in 2019, the Board issued Recommendation [R22-04](#) to TC, which is linked to dormant Recommendation [R00-04](#) and active Recommendation [R13-01](#). To note, Recommendation R22-04 also relates to the TSB Watchlist issue of Following railway signal indications, where there is a risk of serious train collision or derailment if railway signals are not consistently recognized and followed. Since the recommendation was issued, TC has developed a corridor risk methodology, and the Canadian Standards Association has published a set of guidelines for interoperability of enhanced train control applications—both positive steps toward the implementation of physical fail-safe train controls on Canada’s high-speed rail corridors and on all key routes by 2030. However, given the risks to train crews and the travelling public, TC and the railway industry are urged to accelerate the implementation of physical fail-safe train controls on Canada’s high-speed rail corridors and all key routes in Canada. The Board considers the response to Recommendation R22-04 to show Satisfactory Intent.



For all active recommendations, the TSB will continue to monitor the progress of planned actions and call for action to reduce or eliminate these deficiencies.

Who we are and what we do

The Transportation Safety Board of Canada (TSB) advances transportation safety in the air, marine, pipeline, and rail transportation sectors in Canada:

- It conducts independent investigations into selected occurrences and makes findings about their causes and any contributing factors.
- It identifies safety deficiencies arising in transportation occurrences and makes recommendations to eliminate or reduce them.
- It reports publicly about its investigations and findings.

As part of its investigations, the TSB reviews developments in transportation safety and identifies safety risks that governments and the transportation industry must address in order to reduce the risk of injury and loss.

Role of the Board

The Board, which comprises up to five members, including the Chair, approves all investigation reports, makes findings, and issues recommendations.

The Board

Kathleen Fox Chair	Paul Dittmann Board Member	Kenneth Potter Board Member	Yoan Marier Board Member	Leo Donati Board Member
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The TSB website contains [biographies of each Board member](#). In December 2023, the Board welcomed new part-time Member, Dr. Leo Donati, and long-standing Board Member Kenneth Potter was re-appointed.

In making findings, the Board does not assign fault or determine civil or criminal liability for an occurrence. Rather, it seeks to find out what happened and why in an objective manner, independent from government and all other departments and agencies involved in transportation, and free from any conflict of interest. It also draws impartial conclusions and makes recommendations to those best placed to act.

About the TSB

A staff of 245, led by the Chief Operating Officer and an executive management committee, supports the Board. The work of the organization is guided by a [five-year strategic plan](#) and five core values:

- **Respect:** We are committed to inclusiveness and to treating all individuals and organizations with consideration, courtesy, discretion, and fairness.
- **Openness:** We actively share and exchange information to advance transportation safety.
- **Safety:** We maintain and promote a positive and proactive safety culture.
- **Integrity:** We are guided by honesty, transparency, impartiality, propriety, and accountability for our actions and decisions.
- **Excellence:** We maintain a highly skilled and knowledgeable team of professionals through leadership, innovation, and commitment to continuous improvement in the delivery of our products and services.

TSB investigators are professionals with years of experience in the various transportation modes the TSB covers. They work in collaboration with engineering and technical specialists, human factors investigators, and industry analysts, all of whom are supported by small teams of communications specialists, corporate services professionals, and administrative officers.

The TSB's head office is in Gatineau, Quebec. The TSB also has a laboratory in Ottawa, and regional offices in Vancouver, Edmonton, Calgary, Winnipeg, Toronto, Montréal, Québec, and Dartmouth.

The investigation process

There are three main phases of the investigation process. During the field phase, investigators collect data and assess the occurrence. This generally involves travelling to the scene of the occurrence, securing the site and documenting it, conducting interviews and selecting wreckage for further examination. Unless the investigation is limited to data collection, an investigation page is created and posted to the website and is updated periodically as the investigation progresses.

During the examination and analysis phase, investigators review the data to determine the sequence of events leading to the occurrence and the underlying causes and contributing factors.

In the report phase, investigators draft a report on the investigation, which then goes through a review and approval process, prior to public release.

Figure 11. The TSB investigation process from occurrence to report



Once the Board approves the final report, it is released to the public on the TSB website and through traditional and social media.



Appendices

Appendix A: Investigation reports released in 2023–24 and related safety actions

The following is a list of the investigation reports the Transportation Safety Board of Canada (TSB) released during 2023–24. Each entry includes details of any safety actions taken during the investigation and after the report was published, and a link to the main page for the investigation. The list is organized by transportation sector and in the order in which the occurrences took place.

The safety actions taken by industry stakeholders and regulators in the air, marine, pipeline, and rail transportation sectors are the tangible outcome of the TSB’s investigative work to advance transportation safety. Their efforts as a result of our findings contribute to making our transportation system even safer.

Air transportation sector

INVESTIGATION REPORT [A21C0038](#): Collision with terrain, Great Slave Helicopters 2018 Ltd, Airbus Helicopters AS350 B2 (helicopter), C-FYDA, Griffith Island, Nunavut, 25 April 2021

Safety action	Following the occurrence, Great Slave Helicopters 2018 Ltd. <ul style="list-style-type: none">• held an organizational-wide safety stand-down to ensure all personnel were safe to continue work;• carried out a table-top discussion with pilots about operating “in the white;”• used feedback from the table-top discussion and amended the Standard Operating Procedure – North of the Tree Line Operations;• initiated a business continuity audit;• enhanced Helicopter Operations Coordinator training and revised the Helicopter Operations Coordinator Reference Manual with regard to the overdue aircraft procedures;• carried out a downed aircraft exercise to test the new procedures implemented as a result of the occurrence;• increased its pilot recurrent training program, with an emphasis placed on pilot decision making;• hired a third party to audit the company’s system for managing safety;• made several changes to its system for managing safety, including a new manual and in-person training for all employees, and a competency exam;• implemented quarterly safety management meetings;• established a new Aviation Occupational Health and Safety (AOHS) committee to ensure that all federal AOHS requirements were being met and to strengthen the company’s processes for reporting;• placed additional emphasis on the need for suitable accommodations for flight crew operating in the field, during the pre-season briefing with the Polar Continental Shelf Program; and• created a sub-committee that involves pilots and aircraft maintenance engineers in the review process of reports from its system used to manage safety.
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INVESTIGATION REPORT [A21Q0087](#): Runway overrun, Airmédic Inc., Pilatus PC-12/47E, C-GIOX, Sept-Îles Airport, Quebec, 12 September 2021

Safety action	Following the occurrence, Airmédic Inc. amended its standard operating procedures to reduce ambiguities and respond to observations made by Transport Canada Civil Aviation during its reactive process inspection.
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INVESTIGATION REPORT [A21Q0097](#): Controlled flight into terrain, Synergy Aviation Ltd., Guimbal Cabri G2 (helicopter), C-GSYN, Wachigabau Lake, Quebec, 08 October 2021

Safety action	After the occurrence, Synergy Aviation Ltd. conducted a safety management system (SMS) investigation and a report was completed. A series of corrective actions were identified, and the company continues to monitor their implementation. A post-occurrence amendment to the Guimbal Aeromagnetic Survey Procedure (GASP) was incorporated and included a single statement: “ All flights shall be conducted <u>no lower than 200ft AGL</u> [above ground level]. ”
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INVESTIGATION REPORT [A21Q0138](#): Right main landing gear failure on landing, Air Canada, Airbus A330-343, C-GFAF, Montréal/Pierre Elliot Trudeau International Airport, Quebec, 25 December 2021

Safety action	Following this occurrence, Airbus modified the tasks below in the A330 maintenance manual, requesting that operators contact them if damage to the bogie beam or bushings is discovered: <ul style="list-style-type: none"> • 05-51-15-200-801 – Inspection of the Aircraft after a Tire Burst or Tread Throw or Wheel Failure; • 05-51-16-200-801 – Inspection After Brake Overheat; • 32-41-00-210-808 – Detailed Inspection of the Axel and Axel Sleeve after a Wheel Bearing Failure.
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INVESTIGATION REPORT [A22P0023](#): Engine failure and collision with terrain, Kestrel Helicopters Ltd., Hughes Helicopters, Inc. 369D (helicopter), C-GJLC, Port McNeill Aerodrome, British Columbia, 25 NM ESE, 06 April 2022

Safety action	On May 18, 2023, the engine manufacturer re-issued Commercial Service Letter 1255, which includes a recommendation that its customers convert the compressor to the new wheel design during the next overhaul.
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INVESTIGATION REPORT [A22O0060](#): Loss of control and collision with terrain, Diamond Aircraft Sales USA Inc., Diamond Aircraft Industries GmbH DA 42 NG, N591ER, London Airport, Ontario, 25 May 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22C0058](#): Collision with terrain, Pembina Air 1999 Ltd., Rockwell International, Commander Aircraft Division S-2R, C-GOKD, Treherne (South Norfolk Airpark) Aerodrome, Manitoba, 12 NM NE, 02 August 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22C0082](#): Collision with obstacle, Airborne Energy Solutions Inc., Cessna 172, C-GZLU, Shaunavon, Saskatchewan, 6 NM SSW, 18 September 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22Q0116](#): In-flight separation of left wing, privately registered Wag-Aero Sportsman 2+2 (amateur-built floatplane), C-FFDA, Rivière Bonnard Aerodrome, Quebec, 13 NM WSW, 23 September 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22Q0122](#): Loss of control and collision with water, True North Airways Inc., de Havilland DHC-3 Otter, C-FDDX, Pluto Lake, Quebec, 12 October 2022

Safety action	<p>After the occurrence, True North Airways Inc. took the following actions:</p> <ul style="list-style-type: none"> • The company operations manual was amended to reflect the <i>Canadian Aviation Regulations</i> more accurately regarding visual flight rules weather limits; • The fleet of DHC-2 Beaver, Cessna 172K, and Cessna A185F aircraft has been equipped with a flight-monitoring system that can track aircraft movements in near-real time and provide the option to replay flights; • The company's manual on dangerous goods was rewritten and, at the time of report writing, was in the final process of being approved by Transport Canada.
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INVESTIGATION REPORT [A22Q0146](#): Runway Incursion, Greater Toronto Airports Authority, Maintenance Vehicle 31, Toronto/Lester B. Pearson International Airport, Ontario, 15 October 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22Q0126](#): Collision with terrain, Collège d'enseignement général et professionnel de Chicoutimi, Beech Aircraft Corporation C23Sundowner, C-GBQI, Chicoutimi/St. Honoré Airport, Quebec, 21 October 2022

Safety action	<p>After this occurrence, the CEGEP de Chicoutimi introduced the following:</p> <ul style="list-style-type: none"> • A policy that sets a minimum altitude of 200 feet AGL for simulated engine failure exercises, unless the approach and landing is to a runway; • A standard overshoot call; • A ban on conducting circuits at 500 feet AGL.
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INVESTIGATION REPORT [A22Q0142](#): Main rotor blade failure in flight, unregistered RotorWay Exec (amateur built helicopter), Lefebvre, Quebec, 29 November 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22Q0165](#): Collision with terrain, privately registered Cessna 150G, C-FQCS, Bainsville, Ontario, 05 December 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A22A0067](#): Collision with terrain, privately registered Piper PA-46-350P, N5EQ, Goose Bay Airport, Newfoundland and Labrador, 2.5 NM SW, 14 December 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23O0008](#): Loss of control in flight, Chartright Air Inc. (dba Chartright Air Group), Cessna 560 Encore, C-FYMM, vicinity of Cayuga, Ontario, 27 January 2023

Safety action	<p>Following the occurrence, Chartright Air Inc. grounded its Cessna 560 fleet and inspected the engine cowl doors on each aircraft for damage and proper installation. The occurrence and the inspection resulted in a series of internal safety actions.</p> <p>Internal directive</p> <p>Immediately following the occurrence, the company’s maintenance department issued Directive DP-79 to all maintenance staff. The directive made the installation of the upper and lower engine cowl doors a critical task, meaning that the task needs to be double-checked for proper installation.</p> <p>The directive also stated that “No aircraft shall be released for flight if the cowling attachment points do not meet the Aircraft manufacture recommendation.” [emphasis in original]</p> <p>Modification to pilot walkaround standard operating procedures</p> <p>Following the occurrence, the company reviewed the Exterior Inspection checklist in its flight crew procedures (Flight Crew Standard Operating Procedures, Appendix L) to incorporate an item in the left- and right-engine nacelle checks for the correct installation of the Camloc ¼-turn fasteners. This check is required before each flight.</p> <p>Training of maintenance personnel and flight crews</p> <p>Training was provided to all maintenance personnel and flight crews regarding how to ensure that the engine cowl doors are installed securely. The training included information about Camloc fasteners and their correct installation, as well as guidance on checking for excessive forward edge gaps on cowl door panels and verifying the structural integrity of the panels.</p> <p>Engineering Authorization C560-54-002: Improved attachment for upper and lower cowl doors</p> <p>Chartright Air Inc. inspected its Cessna 560 Ultra and Encore fleet and obtained an Engineering Authorization that provides a minor modification to improve the Camloc attachment durability for the upper and lower cowl doors to the nacelles. The modification consists of adding doubler straps along the cowl door edges at the Camloc fasteners and pitching 4 new threaded screws at each of the cowl door corners.</p>
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INVESTIGATION REPORT [A23Q0041](#): Stall and collision with terrain, privately registered Cessna 150G, C-FWGF, Saint-Rémi, Quebec, 21 April 2023

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23P0039](#): Collision with vehicle and terrain, privately registered Cessna 182P, C-GIDY, Langley Regional Airport, British Columbia, 02 May 2023

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23W0048](#): Hard landing, Range Helicopters Inc., Airbus Helicopters AS350 B2 (helicopter), C-FAVX, Edson Airport, Alberta, 04 May 2023

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23C0048](#): Collision with terrain, Custom Helicopters Ltd, Bell 206L (helicopter), C-FQHB, Grise Fiord, Nunavut, 52 NM S (Devon Island), 28 June 2023

Safety action	In response to this occurrence, Custom Helicopters Ltd. added flat-light training to its Company Operations Manual and now provides arctic meteorological training for pilots who are assigned to remote locations. A Flight Operations Instruction was also issued for arctic, glacier, and winter operations with instructions and training for establishing, using, and maintaining staking/flagging
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	in remote landing areas. Improvements have been made to its flight monitoring and operational support via structured use of satellite communications for flight planning/following and weather reporting. Custom Helicopters Ltd. also made enhancements to pilot training by including the correct set-up and use of ForeFlight’s synthetic vision system.
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INVESTIGATION REPORT [A23O0091](#): Fuel exhaustion and collision with terrain, privately registered Cessna 150B, C-GFFG, Alexandria Aerodrome, Ontario, 26 July 2023

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23O0108](#): Ground personnel entanglement with external load, G4 Drilling Canada Ltd. and Expedition Helicopters Inc., Airbus Helicopters AS350 BA, C-FHAU, Wawa, Ontario, 25 NM W, 20 August 2023

Safety action	<p>Following this occurrence, Angus Gold Inc. has implemented an indoctrination session, which includes information on helicopter safety for persons, including contractors, accessing drill sites and working near or with helicopters. All indoctrination sessions and other required training are documented.</p> <p>Angus Gold Inc. has also purchased noise-cancelling helmets that can be connected to the radios and has implemented procedures for using these helmets when conducting longline operations.</p> <p>G4 Drilling Canada Ltd. has modified its tag lines such that the thickness and rigidity of the line do not allow it to coil upon itself, making it more difficult to catch or entangle a person handling the line or equipment on the ground.</p>
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INVESTIGATION REPORT [A23W0100](#): Collision with terrain, Synergy Aviation Ltd., Robinson Helicopter Company (RHC) R44 II, C-GNEC, Grande Cache, Alberta, 30 NM ENE, 25 August 2023

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [A23C0096](#): Incorrect type of fuel, 2080061 Ontario Inc. (dba SkyCare Air Ambulance), Piper PA-31-350, C-GQXD, Pickle Lake Airport, Ontario, 14 October 2023

Safety action	In response to this occurrence, SkyCare issued on 01 December 2023 an operational bulletin outlining the event and the hazards associated with refuelling, and highlighting the need for flight crews to supervise the fuelling of their aircraft.
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INVESTIGATION REPORT [A23O0155](#): Runway excursion, Thunder Airlines Limited, Mitsubishi MU-2B-60, C-GYUA, Wawa Aerodrome, Ontario, 27 November 2023

Safety action	Shortly after the occurrence, Thunder Airlines Limited issued an operations bulletin to all flight crews, indicating that no flight crew shall depart until there is confirmation of suitable runway conditions (maximum ½ inch wet snow or 2 inches dry snow) from reliable sources on the ground. In addition, the bulletin states that if the communicated information includes a plan to clear the runway, confirmation of a cleared runway must be obtained before landing. The bulletin will be incorporated in the Thunder Airlines Limited standard operating procedures in the next revision.
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Marine transportation sector

INVESTIGATION REPORT [M21A0041](#): Catastrophic failure of machinery, subsequent fire, and sinking, fishing vessel *Atlantic Destiny*, 120 nautical miles south of Yarmouth, Nova Scotia, 02 March 2021

Safety action	Ocean Choice International (OCI) implemented a safety management system (SMS) that is compliant with the International Safety Management (ISM) code. In June 2022, upon completion of an audit of OCI’s SMS, DNV issued an Interim Document of Compliance, stating that the company’s SMS was compliant with ISM code.
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	On the OCI vessels <i>Calvert</i> and <i>Katsheshuk II</i> , the instructions for starting the emergency fire pump were posted.
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INVESTIGATION REPORT [M21A0065](#): Capsizing with loss of life, fishing vessel *Tyhawk*, Gulf of St. Lawrence, 20 nautical miles west of Chéticamp, Nova Scotia, 03 April 2021

Safety action	Transport Canada (TC) issued a Ship Safety Bulletin about removable decks in early 2024.
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INVESTIGATION REPORT [M21C0214](#): Person overboard with subsequent loss of life, fishing vessel *Suvak*, Davis Strait, approximately 120 NM northeast of Qikiqtarjuaq, Nunavut, 26 August 2021

Safety action	<p>After the occurrence, Arctic Fishery Alliance took several safety actions. The company:</p> <ul style="list-style-type: none"> • purchased a different style of personal floatation devices with lights for the crew members involved in setting the nets; • provided crew members with specialized rope-cutting knives to be worn on their belts during setting and hauling of the nets. Rope-cutting knives were also placed in areas where nets are hauled and set. The knives are a different color and design from general use knives to avoid confusion; • added metal containers in the top net house and main deck setting areas to hold the 20kg chains so that the chains can be pre-rigged to the buoy line, allowing for hands-free deployment of chains; • added a requirement for one supervisor and two crew members to be involved in setting the nets from the top net house; • updated the Arctic Fishery Alliance crew safety manual to reflect the safety action taken after the occurrence and provided crew members with copies of the manual; • required each crew member to sign off to confirm that they had completed the orientation; • installed a new closed-circuit television system with a 30-day recording capability; • added a new camera and redundant wiring in the top net house, as well as a new camera in the forepeak compartment; • installed a redundant wiring system for all cameras and loud hailers in areas where nets are set and hauled.
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INVESTIGATION REPORT [M21C0265](#): Capsizing, rescue boat *1864*, off Île au Diable, Montréal, Quebec, 17 October 2021

Safety action	<p>Following the occurrence, the Service de sécurité incendie de Montréal withdrew all HammerHead RFV-22 boats from service on 30 September 2022, and replaced them with TITAN outboard-powered boats.</p> <p>The Commission des normes, de l'équité, de la santé et de la sécurité du travail prohibited the Service de sécurité d'incendie de Montréal from operating in the unmarked area of the Lachine Rapids until measures were put in place to ensure safe navigation.</p> <p>The commission also recommended that the Ministère de la Sécurité publique set up a working group to determine the various measures and best practices for improving the health and safety of the various first responders, including firefighters and the police force, during water rescue operations.</p> <p>On 26 April 2023, the Bureau du coroner du Québec filed its inquest report on the death of the firefighter during the occurrence. The coroner made recommendations to the Ministère de la Sécurité publique, all cities in the greater Montréal area, the Service de sécurité incendie de Montréal, the Canadian Coast Guard, and Transport Canada to better protect human life.</p>
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INVESTIGATION REPORT [M22A0312](#): Loss of steerage and grounding, roll-on/roll-off ferry *Confederation*, Caribou, Nova Scotia, 04 September 2022

Safety action	<p>After the occurrence, the following safety actions were taken by Northumberland Ferries:</p> <ul style="list-style-type: none"> • The <i>Confederation's</i> steering system was examined while it was in dry dock. • A procedure has been established and posted on the bridge regarding clutching-in all propellers and the transfer of control from the bridge wing to the centre console. • The company's safety management manual was revised to include an external accident reporting guide. • The company established a Ship Emergency Communication Plan that requires the Canadian Coast Guard be notified of an emergency. • The company implemented the Incident Command System (ICS), with training and a program of periodic drills and exercises, to manage potential incidents. • The company has undertaken a gap analysis of its existing safety management policy and procedure with the Canadian Standards Association Z-1600 Standard for Emergency Management. At the time of the release of this report, the company was developing action plans to resolve any identified gaps. • The company has developed an internal Safety Improvement Plan to improve its safety management system.
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INVESTIGATION REPORT [M22C0335](#): Crew member injury, self-propelled barge *Rivière Saint-Augustin*, Chevery, Quebec, 13 October 2022

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [M22C0338](#): Bottom contact, oil and chemical tanker *Kivalliq W.*, Chesterfield Narrows, Baker Lake, Nunavut, 18 October 2022

Safety action	<p>The crew of the <i>Kivalliq W.</i> reported the uncharted submerged object to Marine Communications and Traffic Services in Iqaluit, Nunavut, and a regional warning was published the day of the occurrence. Ten days later, after the Canadian Hydrographic Service (CHS) reviewed the data provided by the vessel, a second navigational warning was published.</p> <p>Following the occurrence, the CHS reviewed the data collected from the 2016 hydrographic survey, and on 31 March 2023, the CHS published a chart correction to indicate depths of 5.1 m in the area of the occurrence. This cancelled the second navigational warning.</p> <p>The first navigational warning will remain in effect until a hydrographic survey is carried out.</p>
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INVESTIGATION REPORT [M22A0355](#): Bottom contact, passenger vessel *Kawartha Spirit*, Halifax, Nova Scotia, 26 October 2022

Safety action	Following the occurrence, Ambassatours Gray Line created a standard operating procedure for its vessels operating in restricted visibility and added the procedure to its SMS. The company has also modified its training for new operators with a focus on the SMS procedures related to on-board operations.
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Pipeline transportation sector

INVESTIGATION REPORT [P22H0023](#): Pipeline rupture and fire, NOVA gas Transmission Ltd. 8-inch Simonette Lateral natural gas pipeline, near Fox Creek, Alberta, 07 April 2022

Safety action	After the occurrence, TC Energy replaced the damaged sections of pipe of the NPS 8 Simonette Lateral and initiated steps to permanently shut down and abandon the entire pipeline.
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Rail transportation sector

INVESTIGATION REPORT [R19V0002](#): Main-track train derailment, Canadian Pacific Railway Company, freight train 401-02, Mile 128.9, Laggan Subdivision, Partridge, British Columbia, 03 January 2021

Safety action	<p>As a result of the occurrence, Canadian Pacific Railway Company (CP) took the following safety action:</p> <ul style="list-style-type: none"> • Issued a maintenance alert on 95 TTZX centrebeam flat cars actively operating on CP lines to inspect the intermediate air hose for potential kinking during trainline trolley movement. • Issued service bulletin No. 19-001 (January 10, 2019) regarding the inspection of rail cars. • Engaged a TTZX rail car engineering team to issue an alert to the rest of industry. • Issued a service bulletin No.19-003R (January 16, 2019) regarding the inspection of all CP 521, 522, and 315 series cars. • Conducted an extensive review and analysis of mixed-merchandise train make-ups operating west of Calgary on 555 trains between November 2017 and August 2019. • Issued operating bulletin OPER-AB-65-19 (August 27, 2019) concerning restrictions in TrAM area 3 territory, which includes sections of the Laggan and Mountain subdivisions, for centrebeam and/or bulkhead flat cars equipped with end-of-car cushioning devices.
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INVESTIGATION REPORT [R19T0107](#): Main-track derailment, Canadian National Railway Company, freight train M38331-27, Mile 60.55, Strathroy Subdivision, Sarnia, Ontario, 28 June 2019

Safety action	<p>In response to TSB Rail Safety Advisory (RSA) 08/19, Transport Canada (TC) wrote to the Railway Association of Canada and the Western Canadian Short Line Railway Association recommending that Canadian railways ensure that their equipment, procedures, and instructions be reviewed and updated, as required, to ensure employee safety.</p> <p>Following the derailment, Canadian National Railway Company (CN) inspected 416 of the 2130 identified cars of similar type and vintage to the occurrence bathtub gondola car and that were being used in scrap iron and steel service in North America. CN identified defects in 149 of the 416 cars (36%).</p> <p>The Association of American Railroads (AAR) issued maintenance advisories MA-0188 and MA-0198, Early Warning EW-5344 and Equipment Instruction EI-0017 to the rail industry requiring the inspection of specified bathtub gondola cars. Equipment Instruction EI-0017, which was issued subsequent to the maintenance advisories and early warning, requires Berwick Forge bathtub gondola cars of the same vintage as the occurrence car to be inspected every 2 years. Cars identified in the equipment instruction are automatically prohibited from interchange under the AAR Interchange Rules unless they have been inspected within the 2-year timeframe and determined to be free from specified defects. The process will repeat every 2 years for each car on the list.</p> <p>The 2020 AAR Interchange Rules governing centre sills, draft sills, coupler carriers, and side sills were revised to include causes for attention related to stub sills and side sills defects.</p>
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INVESTIGATION REPORT [R19W0320](#): Main-track derailment, Canadian Pacific Railway Company, freight train 516-398, Mile 48.86, Sutherland Subdivision, near Guernsey, Saskatchewan, 09 December 2019

Safety action	<p>In response to RSA 02/20, TC issued a number of ministerial orders (MO), including the following:</p> <ul style="list-style-type: none"> • On April 1, 2020, TC issued MO 20-05, which indicated that, pursuant to the provisions of section 32.01 of the <i>Railway Safety Act</i>, federally regulated railway companies were ordered to implement additional safety measures for key trains. • On April 1, 2020, TC issued MO 20-06 pursuant to the provisions of paragraph 19(1)(a) of the <i>Railway Safety Act</i>. The MO ordered federally regulated railway companies to revise the <i>Rules Respecting Key Trains and Key Routes</i>.
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	<ul style="list-style-type: none"> On November 6, 2020, TC issued MO 20-10 pursuant to the provisions of section 32-01 of the <i>Railway Safety Act</i>. <p>With the issuance of MO 20-10, MO 20-05 was repealed, and federally regulated railway companies were ordered to implement additional safety measures for key trains.</p> <p>On February 22, 2021, TC approved the revised <i>Rules Respecting Key Trains and Key Routes</i> submitted by the industry.</p> <p>On April 1, 2020, TC issued MO 20-07, in response to RSA 03/20, which indicated that, pursuant to the provisions of paragraph 19(1)(a) of the <i>Railway Safety Act</i>, federally regulated railway companies were ordered to revise the <i>Rules Respecting Track Safety</i>. As of May 31, 2023, all phases have been completed and are in effect.</p> <p>In response to this occurrence and subsequent derailments that occurred on subdivisions governed by the occupancy control system, CP has implemented its own wayside system for the detection of track discontinuities in non-signalled territory. The system can detect broken rails and indicate the presence of trains. It works by sending a low-voltage signal through the rails and relies on technology found in other industries, such as solar cells, lithium-ion batteries, and miniaturized signal-processing circuits. Territory equipped with this system would still be considered dark territory.</p> <p>Since the occurrence, CP has added two more autonomous track geometry measuring systems and is building another one, which will bring the total to five.</p>
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INVESTIGATION REPORT [R20V0185](#): Main-track derailment, Canadian National Railway Company, freight train J60352-12, Mile 44.4, Yale Subdivision, Floods, British Columbia, 14 September 2020

Safety action	The Board is not aware of any safety action taken following this occurrence.
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INVESTIGATION REPORT [R21V0144](#): Locomotive engine fire, Canadian Pacific Railway Company, freight train 880-066, Mile 54.3, Cranbrook Subdivision, Elko, British Columbia, 08 July 2021

Safety action	<p>To comply with MO 21-06 issued on July 11, 2021, in which TC required railways to implement measures to increase their capacity to detect, monitor, and suppress fires, CP implemented the following:</p> <ul style="list-style-type: none"> A measure ensuring that no locomotive is operated through areas where the fire danger is rated as extreme, unless it has been inspected in the previous 15 days. Extreme weather fire risk mitigation plans that address fire detection, monitoring, and response measures. Enhanced vegetation control measures along the right-of-way.
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INVESTIGATION REPORT [R21S0048](#): Main-track derailment, Canadian Pacific Railway Company, freight train 603-897, Mile 32.75, Lanigan Subdivision, Silton, Saskatchewan, 16 October 2021

Safety action	On 29 July 2022, CP implemented its Rail Integrity Non-Vital Overlay Detectors (RINOD) system on the Lanigan Subdivision. The RINOD system sends automatic notifications to CP's Operations Centre in the event of a broken rail, rail gap, loose joint, or rail joint pull-apart. The notifications provide advance warnings that allow the Operations Centre to stop a train before it encounters any such track discontinuities in non-signalled territory.
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INVESTIGATION REPORT [R22D0106](#): Non-main-track derailment, Canadian National Railway Company, train M32621-11, Mile QM 192.1, CSX Transportation Montreal Subdivision, near Huntingdon, Quebec, 11 December 2022

Safety action	On April 19, 2023, TC responded to Rail Transportation Safety Information Letter 01/23 by stating that it had contacted the railways involved and that, in both occurrences, TC found that the companies had taken appropriate measures to ensure that the locomotive voice and video recorder (LVVR) systems function in accordance with the requirements of the regulations.
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	<p>TC also stated that it had developed a regulatory oversight plan. TC's first area of focus was on the installation of LVVR systems and verifying compliance with the procedures to ensure that companies meet privacy requirements.</p> <p>Following the occurrence, CSX Transportation added the precise location of each fixed derail to its Montreal Subdivision timetable. The information also specifies the normal position (derailing and non-derailing) of each derail.</p>
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